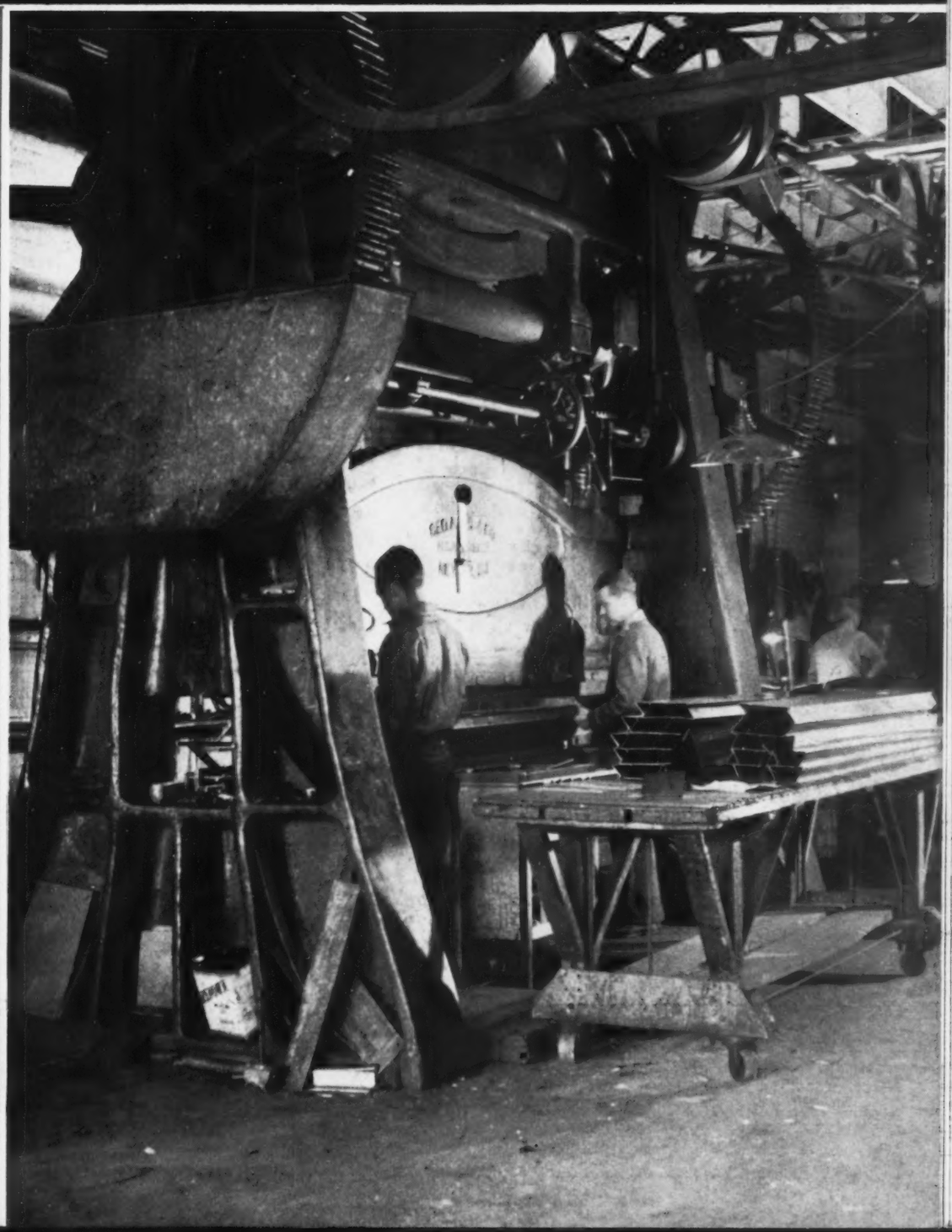
AMERICAN ARTISAN

WARM AIR HEATING • AIR CONDITIONING
SHEET METAL CONTRACTING



AIR
CONDITIONING
SECTION
PAGE 35

ESTABLISHED
1880

NOVEMBER
1937

AN arc welder meets modern needs for profitable fabrication and repair work only when it provides a faultless output of current for light-gauge welding as well as for heavier work.

Both a wide welding range and faultless output at all points in that range are provided exclusively by the modern G-E single-operator arc welder, with its new, improved features of design and performance. You can turn the current on full tilt, cut it down to a trickle, or set it anywhere in between — you get a "peppy," stable arc at all points in the entire range. It meets Navy specifications on every adjustment.

But why not ask the nearest G-E arc-welding distributor or G-E sales office for a demonstration of this modern arc welder? Or write General Electric, Schenectady, N. Y., for descriptive bulletin GEA-1440F.

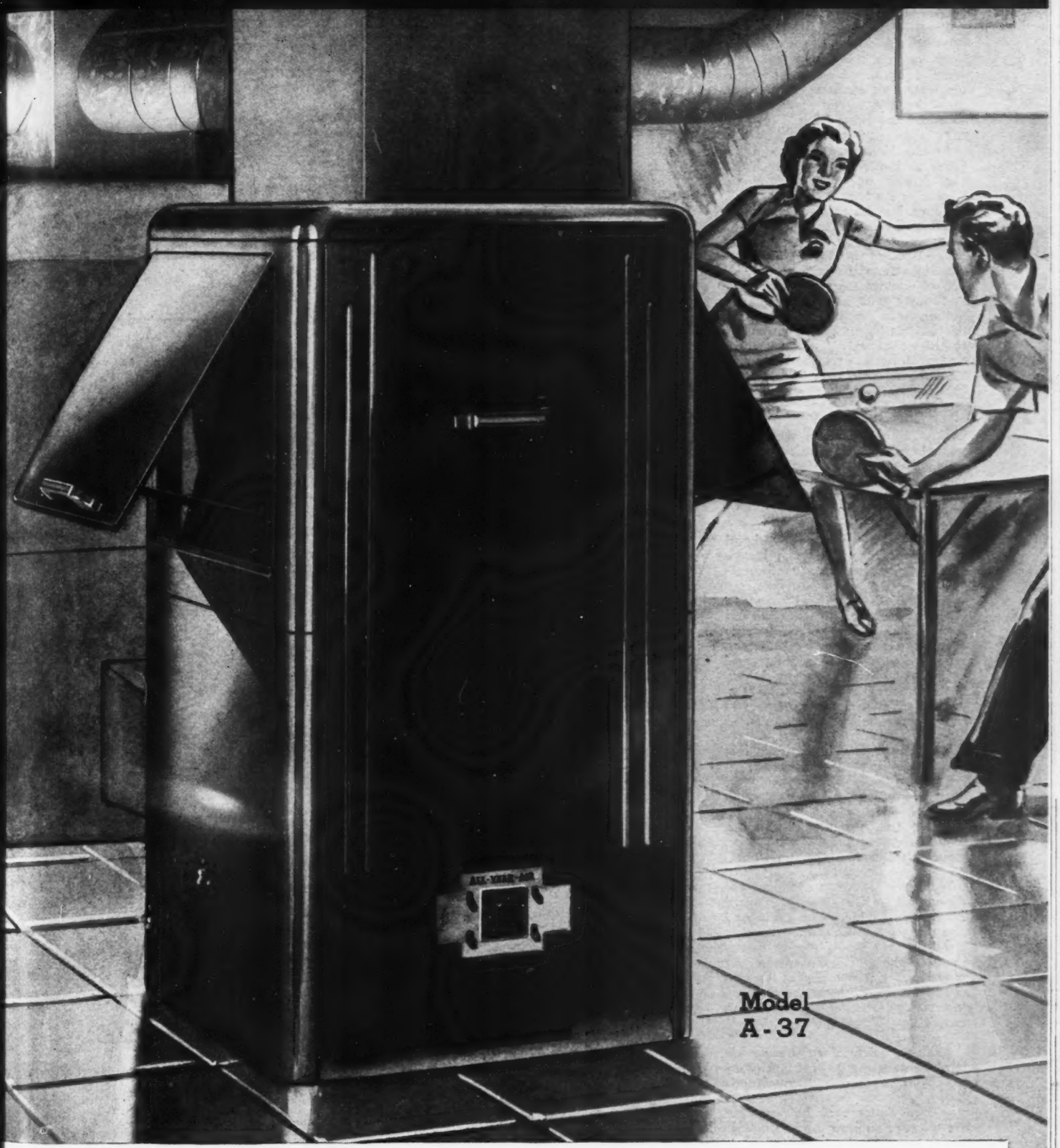
To give you the right equipment, General Electric builds the largest and most complete line of arc welders in the world.

GENERAL ELECTRIC

8748

140-71

ALL-YEAR-AIR CONDITIONED



YOU will make more money following the aggressive Auburn sales plan, than trying to sell single-purpose units. ALL-YEAR-AIR combines complete Winter Air Conditioning with Summer Cooling; a Super-Value that includes 8-Speed Air Motion, Humidifying, Filtering, Ozonizing and Ionizing. All at a price that is hundreds of dollars less than if each of these elements were bought separately.

Write AIR CONDITIONING DIVISION, Auburn Automobile Company.

General Sales Office: 2426 Michigan Avenue, Chicago. *Factory: Connersville, Indiana*

In This Issue

IN numerous issues during the past two years we have published articles describing the shop production methods employed by contractors fabricating metal specialty items as regular production items. This interesting development among the larger shops is typified by the description of the fabrication of stainless steel scale pans by the Lumm Company of Toledo. See page 20.

★

Arnold Kruckman, on page 26, takes us behind the scenes of the tax drama and produces some bogies in the form of taxes on $600 incomes, income confiscation, more business taxes and so forth.

★

The various articles on fume removal, material collection or separation, blow piping in industry, by R. F. Jeske will, when gathered together, be a nearly complete treatise on this important phase of our industry's work. The strip tanks and acid crocks described on page 28 are a common industrial hazard. This system satisfies state laws.

★

Joseph G. Dingle, on page 32, explains (with examples) what happens to profit when sales volume falls off—overhead remaining stationary—or what happens to profit when overhead or cost of sales goes up without a proportionate increase in sales volume. Sales volume, cost of sales and overhead must bear appropriate relationships if business is to continue.

★

Part 2 of the reprinted report on oil burning furnace tests in the Research Residence appears on page 51. As a result of these tests a number of suppositions and guesses have been permanently laid in moth balls. If you are installing oil burning equipment you should be familiar with results.

★

For purposes of estimating—not for engineering—it is often advantageous to make a very quick heat loss calculation. E. A. Bailey, on page 54, supplements his suggestions of last January with additional tables and explanation and works a problem.

★

With this issue we finish our discussion of the new technical code. We locate the returns and size the pipes. We gather together our branches and size the trunks in the basement. We correct our pipes for resistance and at the end of the article we have the finished job ready for the blower to be turned on. Page 56.

★

Are you going to emphasize humidity this winter? Will you guarantee to meet any homeowner's humidity specifications? If you do you had better now be prepared for some thorough and complete house revamping and should know all about your apparatus. On page 60 you will find some humidity facts, based on tests, which may interest you.

AMERICAN ARTISAN

With which is merged

FURNACES and SHEET METALS AND Warm-Air Heating

Covering All Activities in

Gravity Warm Air Heating — Forced Warm Air Heating
Sheet Metal Contracting — Ventilating
Air Conditioning

J. D. Wilder, Editor

A. A. Kennedy, Assistant Editor — Brewster S. Beach, Consulting Editor

Vol. 106, No. 11 — November, 1937 — Founded 1880

CONTENTS

THE AIR CONDITIONING SECTION

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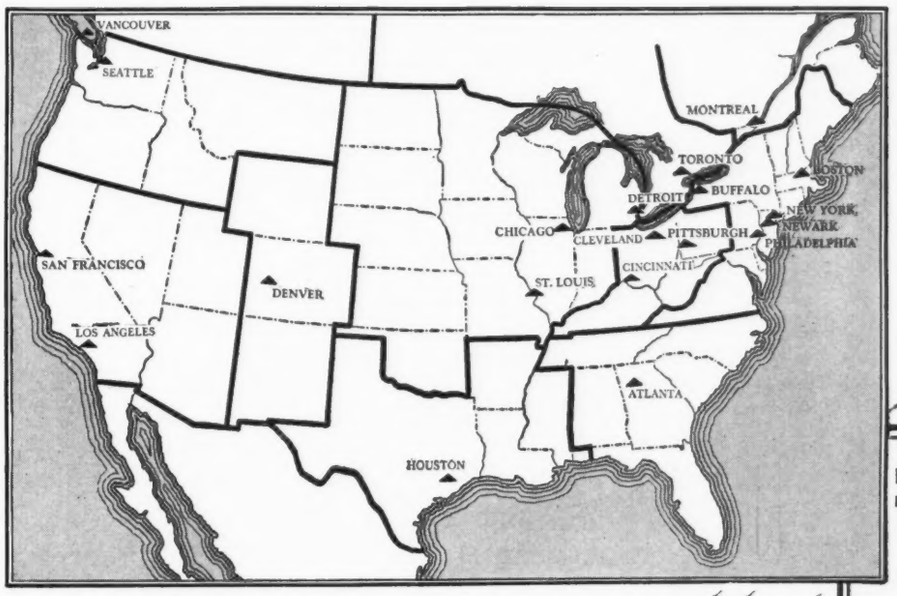
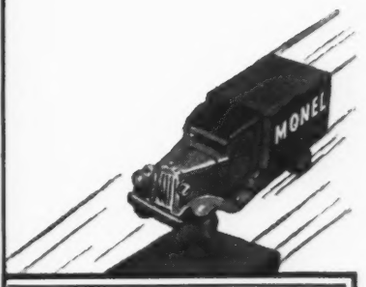
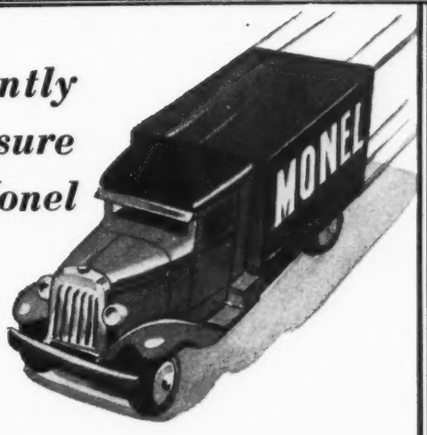
More than 8,000 Copies of this Issue are being distributed

A SHORT HAUL for the LONG-LIFE METAL





Twenty-one conveniently located warehouses assure prompt deliveries of Monel



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Monel is shipped from warehouse stocks located at twenty-one strategic points throughout the country. Sheets, rods, bars, welding rod and accessories . . . almost any form of Monel can be shipped to you at short notice.

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My First Choice in Air Conditioning Grilles . .

— And Here's Why

This grille has remarkable depth (a full inch) and curved tubular openings, which in practical results, means that it assures:

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Ask your jobber to show you the H & C No. 90 and we believe you will agree that it's "tops" in Air Conditioning Grilles. Inspect the rest of the very comprehensive H & C Air Conditioning line, too; it contains grilles and registers ideally suited to every requirement. No. 37 AC Air Conditioning Catalog will be sent on request.

H&C No. 90 DESIG

Streakproof Rubber Gasket now furnished as standard on all 3-piece sidewall registers.

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Warm Air Registers
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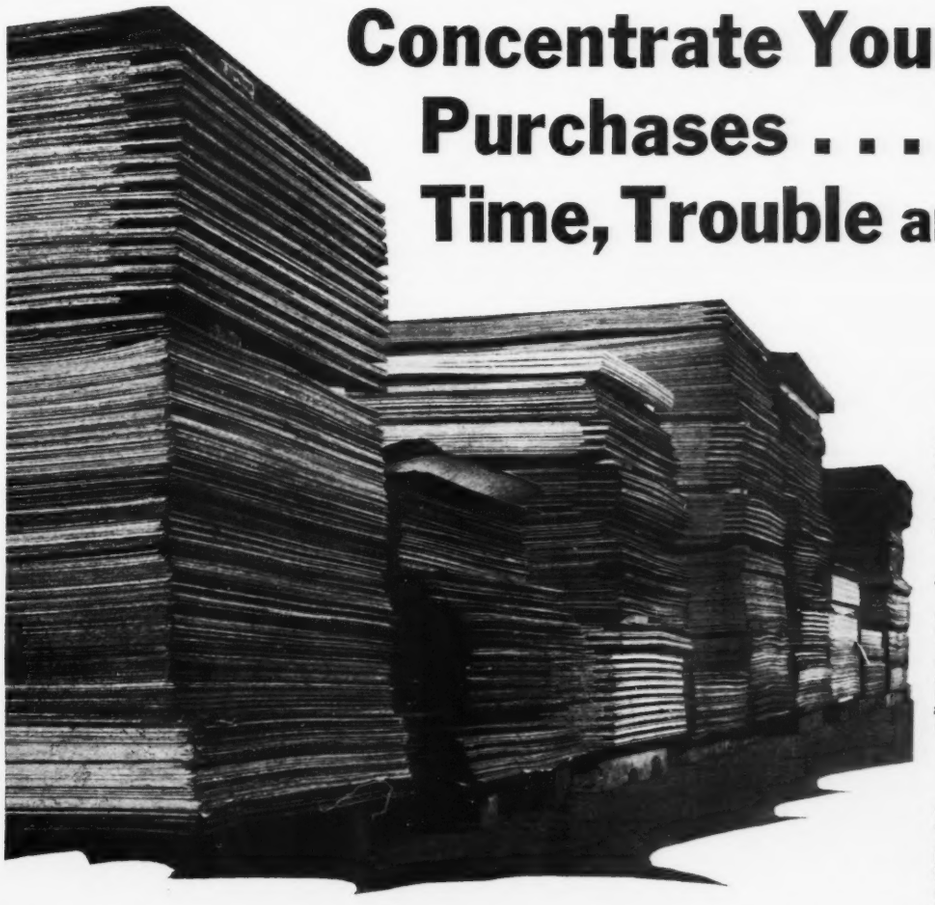


Concentrate Your Steel Purchases . . . and Save Time, Trouble and Money

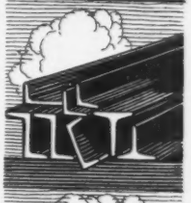
Sheets, Bars, Angles, Channels, Rivets, Welding Rod and all other steel products shipped immediately

Ryerson sheets—more than twenty-five different kinds—are but one unit of the wide range of steel products carried in stock for immediate Shipment. There is hardly a product in the finished steel and allied lines that you cannot secure at once from the nearest Ryerson plant. This makes it easy to concentrate all your steel requirements and save office work, time, trouble and money. An experienced organization with special handling, cutting and dispatching facilities assures prompt shipment of every order—large or small. If you do not have the current Ryerson Stock List, write to our nearest plant. We will be glad to send it.

Joseph T. Ryerson & Son, Inc., Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City

BARS—ALL SHAPES AND SIZES
Rounds, squares, flats, hexagons, ovals, half-ovals, half-rounds, bevel edge flats, etc., in a full range of sizes.

CHANNELS ANGLES, TEES, ETC.
A complete range of both structural and bar sizes in all standard sections, also galvanized angles, ship and car channels, etc.



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Stocks include cold rolled strip in dead soft, half hard and hard qualities, also cold rolled flat wire in coils or cut lengths.

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More than 20 types including both electric arc and gas welding rods are carried in stock. Write for Bulletin.

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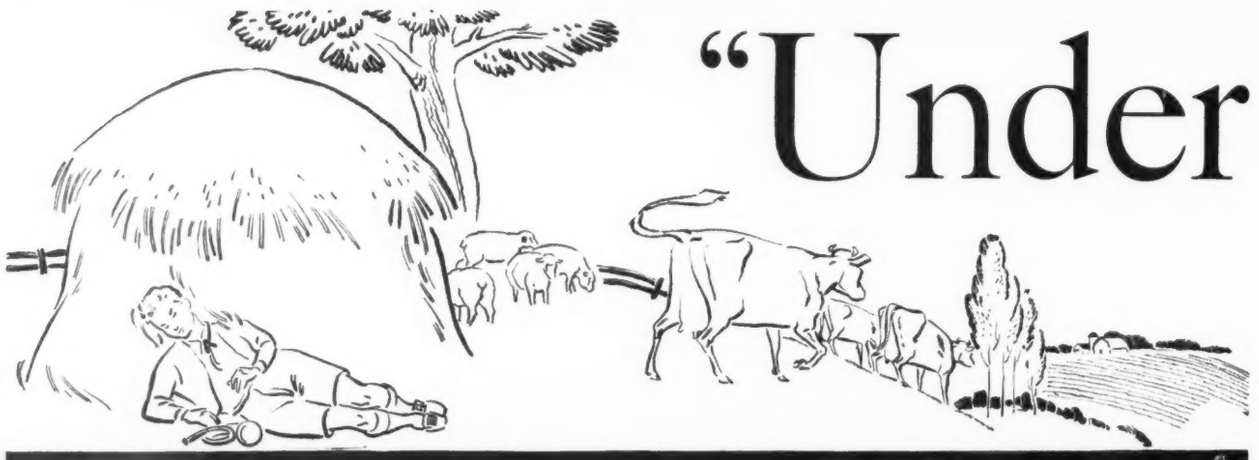

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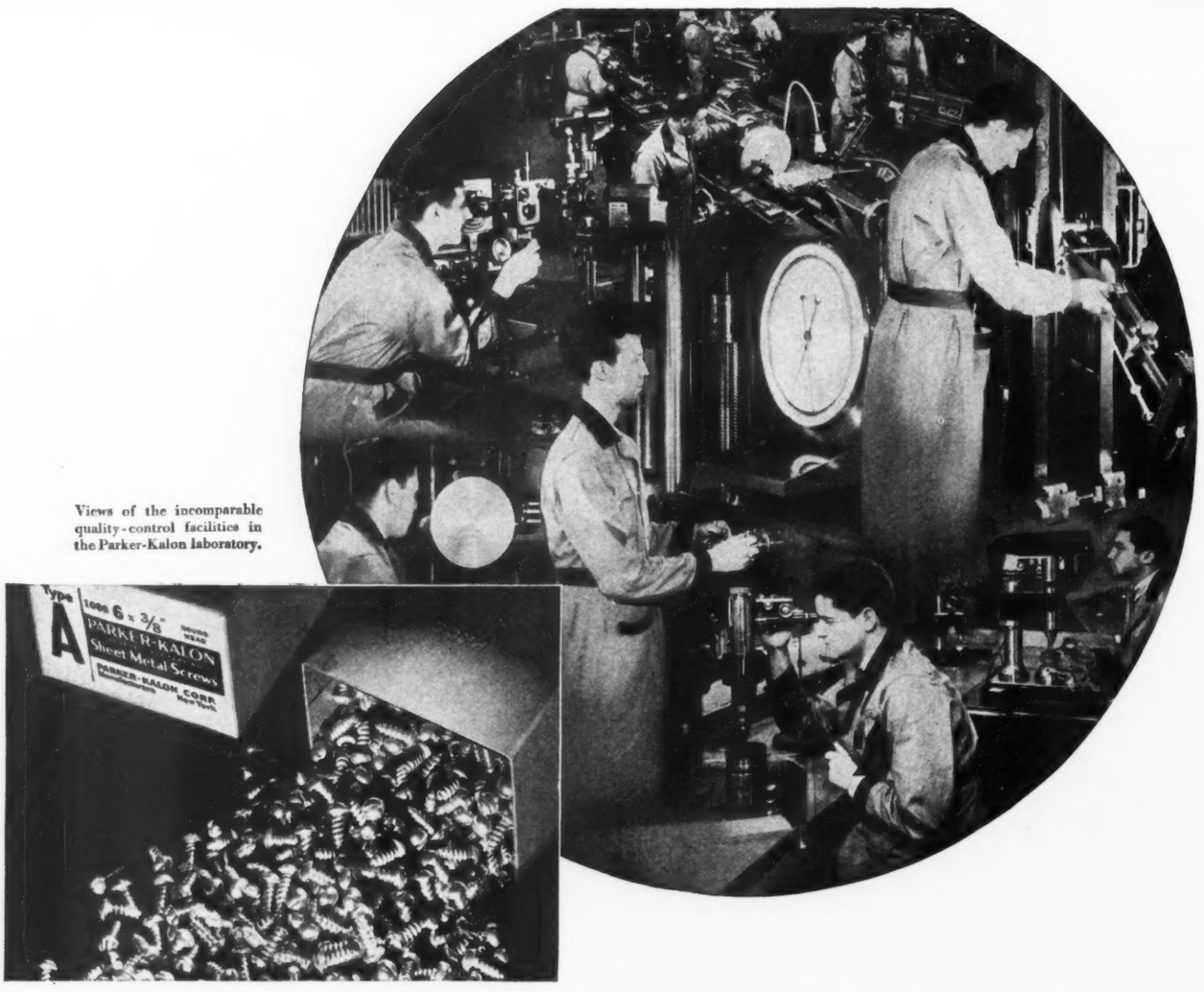

Views of the incomparable quality-control facilities in the Parker-Kalon laboratory.

EVERY SCREW A TIME-AND-LABOR SAVER!

-that's what Parker-Kalon's incomparable "quality-control" over genuine Sheet Metal Screws means to you

When you consider that economy in assembling sheet metal is the result of multiplied small unit savings, you see what Parker-Kalon's famous quality-control laboratory means to sheet metal workers. Consistently satisfactory performance from every screw in a boxful is a necessity. EVERY screw must go in easily and hold tight. Threads must not strip . . . heads must not twist off. Trouble with a few screws may easily wipe out the time-and-labor saving effected by a hundred.

It is important, then, to specify PARKER-KALON and get genuine Sheet Metal Screws . . . kept to a uniformly high standard of quality by scientific and mechanical facilities without counterpart in the screw industry. Made better, too, by Parker-Kalon's unequalled experience of 25 years in producing this specialized type of screw.

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PARKER-KALON CORPORATION
190 Varick Street New York, N. Y.

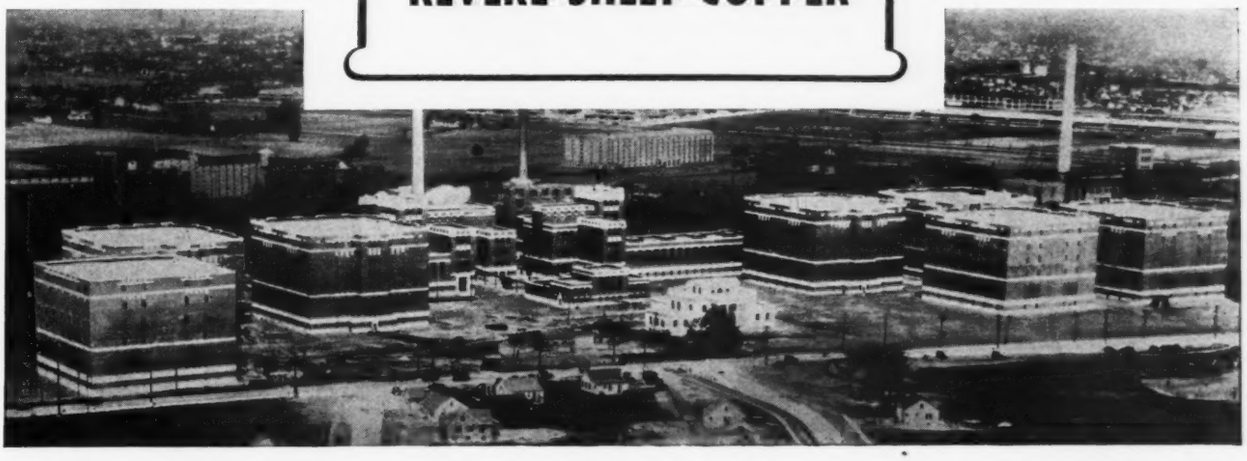
HARDENED

PARKER-KALON SHEET METAL SCREWS

SELF-TAPPING

SOLD ONLY BY RECOGNIZED DISTRIBUTORS

Giant New Seagram Distillery *flashed with 15 tons* OF REVERE SHEET COPPER



New Seagram Distillery, Louisville, Kentucky. Nearly 15 tons of Revere Sheet Copper were used for flashing in constructing this great plant. Architects: Joseph & Joseph, Breslin Bldg., Louisville, Ky. General Contractor: J. & E. Warm Company, 2335 Florence Ave., Cincinnati, Ohio. Roofing and Sheet Metal Contractor: Joseph Bowling, Louisville, Ky. Revere Sheet Copper supplied through The Conner Manufacturing Co., Louisville, Ky.

*** Nearly 15 tons of Revere Sheet Copper were used for flashing in constructing the new Seagram Distillery at Louisville, Ky. No expense was spared in making this great new distillery the last word in modern plant design for the production of fine whiskies.

In the nation's capital—in New York, Chicago—in every part of the country where notable buildings are erected—Revere Sheet Copper, Revere Leadtex (lead-coated sheet copper), Cheney Flashing and Revere Thru-Wall Flashing are protecting fine building structures of every type.

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INCORPORATED
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SHEET COPPER HANDBOOK: A new edition of this important treatise on applications of sheet copper in building construction has just been published by the Copper and Brass Research Association. Copy free to architects and sheet metal contractors. Please address your request for this book to the Copper & Brass Research Association, 420 Lexington Avenue, New York City.

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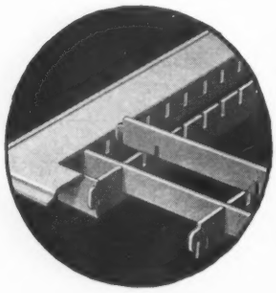
NEW AUER DURABILT Floor Registers *and* Cold Air Faces

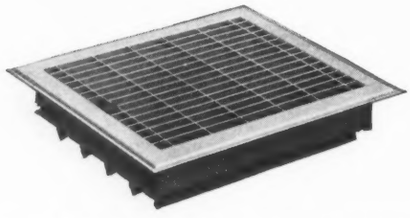
The splendid reception given AUER "DuraBilt" Registers by the trade is a happy indication of the better VALUE Auer has put into these new models. Knowing the care in design and the substantial construction of DuraBilt Registers and Intakes, we are more than confident as to their future popularity. The steel cross-bar assembled face is locked at every intersection and tenoned into frame—*built* for *durability.*

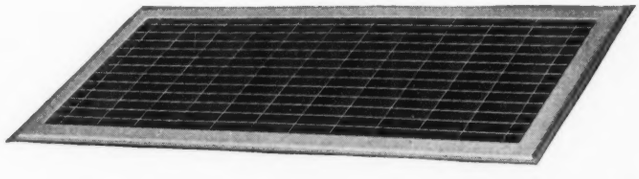
See these attractive, new Auer designs at your source of supply. Test their strength and rigidity. You will agree that they are *constructed* as splendidly as they *look*—that they present something *new* in Register Value. DuraBilt Folder sent on request.



- Multi-Lock assembly for Super Strength and Extra Rigidity.
- All - Steel bars — mortised at joints, close-fitted.
- Face interlocked to frame at every connection.
- Ample capacity for air-flow.
- Auer medium-size mesh is close enough to exclude small objects, but narrow mesh can be furnished if preferred.

"Built for durability"





THE AUER REGISTER COMPANY, 3608 PAYNE AVENUE, CLEVELAND, OHIO

AUER DISTINCTIVE **REGISTERS**

& GRILLES For Air Conditioning *and* Gravity

Ten million youngsters drink a toast in healthful milk — *to steel*

Milk travels a long route from the cow to your youngster's cup . . . . a route made possible -- *made safe* -- by steel.

In modern dairies, cows are milked by sanitary steel milking machines. Milk pails and cans are of steel for positive sterilizing. Steel trucks bring the milk to market. Steel pasteurizers insure its safety. Steel wagons deliver the milk to your street, and in a steel basket the milkman carries it to your door.

So begins your day, in which steel plays an all-important part. You shave with a steel razor. Your coffee "perks" in steel. You ride in a steel car, to work in a steel-framed building, at steel machines, typewriter or desk. Your dinner is cooked on a steel range, you read at a lamp wired through steel conduit, you go to sleep on steel springs. Youngstown makes these steels -- each steel developed by research to best serve its purpose.

QUALITY TRADE MARK YOUNGSTOWN SERVICE

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon and Alloy Steels

General Offices - - YOUNGSTOWN, OHIO

YOUNGSTOWN

Sheets - Plates - Pipe and Tubular Products - Conduit - Tin Plate - Bars - Rods Wire - Nails - Unions - Tie Plates and Spikes

25-2A

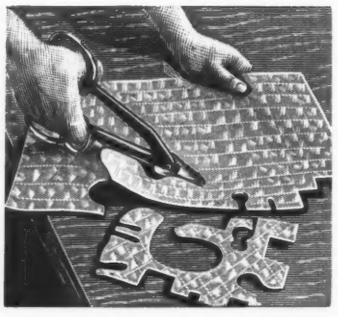
WISS TINNERS SNIPS

BEST BY ACTUAL TEST

PRECISION GROUND—ACCURATELY TEMPERED—FACTORY TESTED
"HIGH-POWER" SNIPS WILL CUT ALLOY METALS

WISS SCROLL-PIVOTER SNIP

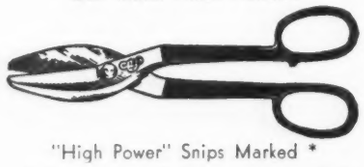
Cuts circles, scrolls, and squares as easily as a straight line.



Number	Length	Finish
9X	12 in.	Dull Gray Nickel

Here's a sensational new snip, the exclusive features of which cannot be appreciated until you have actually cut with it. No other form-cutting snip will do a quicker or better job—in fact, the pivoting principle of this new snip enables it to cut intricate shapes with an incredible ease that no other snip can equal. It will cut ordinary galvanized sheets up to 18-gauge, and Monel Metal sheets of average thickness.

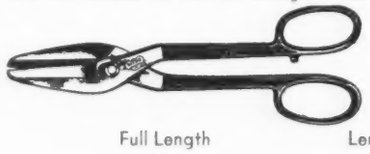
REGULAR PATTERN TINNERS' SNIPS
Inlaid Crucible Steel Blades
Gun Metal Finish Handles



"High Power" Snips Marked *

Number	Full Length	Length of Cut	Number	Full Length	Length of Cut
13	7 in.	2 in.	* 9	12½ in.	3 in.
12	8 in.	2 in.	* 8	13¾ in.	3½ in.
11	9½ in.	2¼ in.	* 7	14½ in.	4 in.
*10	11½ in.	2½ in.	* 6½	15¾ in.	4½ in.

COMBINATION PATTERN TINNERS' SNIPS
Inlaid Crucible Steel Blades
Will cut circles as well as straight lines



Number	Full Length	Length of Cut
*100	11½ in.	2½ in.
* 19	12½ in.	3 in.
* 18	13½ in.	3½ in.
* 17	14½ in.	4 in.

CURVED BLADE PATTERN TINNERS' SNIPS
Inlaid Crucible Steel Blades

Number	Full Length	Length of Cut	Number	Full Length	Length of Cut
11 C.B.	9½ in.	2¼ in.	8 C.B.	13¾ in.	3½ in.
10 C.B.	11½ in.	2½ in.	7 C.B.	14½ in.	4 in.
9 C.B.	12½ in.	3 in.	6½ C.B.	15¾ in.	4½ in.

"NU-GRIP" SNIPS
With or Without Springs

WONDERFUL CUTTERS **EASIER TO USE**

COMBINATION PATTERN
For Curved, Irregular and Straight Work

This Combination or Scroll Nu-Grip Snip with spring will cut curves, circles and irregular work faster, neater and easier than any other snip of its type. For use on templates, fixtures and metal pattern work. Furnished in two sizes.

Number	Length
U C-8	8 in.
U C-9½	9½ in.

REGULAR PATTERN — For Straight Work

The Straight pattern Nu-Grip Snip, equipped with spring, is the finest and fastest tool of its size for straight cutting on metal—much easier to operate. Furnished in two sizes.

Number	Length
U-7	7 in.
U-8½	8½ in.

NEW BULLDOG SNIP FOR HEAVY DUTY
Precision Ground, Inlaid Crucible Steel Blades
Short Powerful Jaws and Long Handles
Give Wonderful Leverage

Made in Two Lengths

Name	Length o/a	Length of Cut
*Bulldog	17 in.	2½ in.
*Bulldog	14 in.	2½ in.

LIGHT METAL SNIPS No. J-7
With Curved or Straight Blades

This handy Snip is the best known and most universally popular type used for light metal work, by electricians, tinsmiths, plumbers, jewelers, dental workers and wherever light metal templates or patterns are required to be cut.

It is light—strong—easily handled—made of fine tool steel, accurately tempered, and is ideal for all-purpose light work. It is a surprisingly powerful cutter.

Number	Length	Cut
J-7	7 in.	1¼ in.

J. WISS & SONS CO., NEWARK, N. J.

LEADERS SINCE 1848

No New Automobile Or Radio Will Keep a Home Warm This Winter!

"New Model" time is here. People with money to spend are looking for the best VALUES for their dollars. So—

Are You Making Any Effort to Convince Prospects That a New Furnace Will Be on the Job Giving Homes Live-In-Able Temperatures Years After All the New Autos Have Gone Their Last Mile?

Right now—within a mile of YOU as you read this—are homes needing new heating equipment or the modernization of what they have *and the owners have the money to pay the price*—but if they buy Horse Power instead of Heat Radiation you lose money!

HANDY PIPE

"Built to Outlast the Buildings It Goes into"

is the industry's leader in service to both installer and consumer.

Accurately designed for every job from the simplest to the most intricate, and prefabricated to keep labor costs at a minimum, HANDY PIPE helps every job perform to your credit.

If you haven't our Catalogue No. 50, ask for a copy.

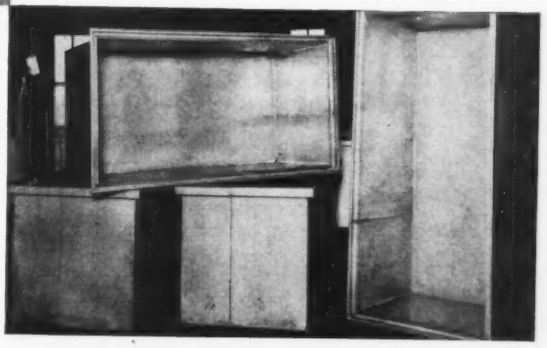
F. Meyer & Bro. Co.

Peoria
Illinois

HOW TO EARN PROFITS *off the beaten path*

ABOVE: Nineteen stainless steel preserving tanks installed in the University of Indiana Medical School. Armco 18-8 Stainless Steel, 22 gage, number 2b finish, was selected because of the severe conditions. Both carbolic acid and formaldehyde are used in the solution.

BELOW: View of tanks after being formed in the shop of a leading contractor of Indianapolis, Indiana.



● Sheet metal contractors everywhere are stepping up profits by doing out-of-the-ordinary jobs with Armco Stainless Steels. You, too, can use these popular metals to land jobs that your skill and experience equip you to do.

Armco Stainless Steel sheets can be formed, welded, soldered, or riveted with no trouble at all. Use them as dress-up sheets or to withstand severe corrosive or oxidizing conditions. Atmospheric corrosion as well as many acid solutions do not affect their durable surface. An occasional wiping with a damp cloth is all that's required to keep the polished finishes bright and shining.

There is a correct grade of Armco Stainless for your purpose. And you can choose one of six different finishes ranging from white pickled finish to high lustre-polish. The nearby Armco Stainless Distributor will give you quick deliveries. Ask him to help you on problems of application or fabrication, or write direct to us. The American Rolling Mill Company, 2160 Curtis Street, Middletown, Ohio.

ARMCO

ARMCO STAINLESS STEELS

THE SILVERY METAL OF GOLDEN OPPORTUNITY

● This bright, lustrous metal of a thousand uses is leading sheet metal contractors to new business – to greater profits. Every day it finds application where the fabrication and installation is being handled or easily could be handled by a sheet metal shop.

The selling points of ENDURO – Republic's Perfected Stainless Steel – are many. It is a beautiful metal, bright and shining or with a soft, silvery lustre that lasts a lifetime. ENDURO combats rust and corrosion. It will not chip or peel. It has marked resistance to atmospheric corrosion conditions, requiring but minimum care and maintenance. It is unaffected by fruit and meat juices, by dairy products or by alcoholic liquors. It resists most chemicals. And ENDURO can be fabricated without difficulty.

You'll find many an opportunity – golden opportunity – knocking at your door – if you use ENDURO. Write for further information.

Above is shown a typical ENDURO building installation fabricated and installed by a sheet metal contractor – Spring Sheet Metal Co., Rochester, N. Y. Pilasters, door casings, coping, marquee, marquee ceiling and circle work on windows required 1½ tons of ENDURO. Would you like detailed information on how to fabricate ENDURO? It will be sent gladly upon request.

Republic Steel
Corporation

GENERAL OFFICES . . . CLEVELAND, OHIO

ALLOY STEEL DIVISION . MASSILLON, OHIO

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AMERICAN ARTISAN

Volume 106 Number 11

Codes Need Education

A CONTRACTOR said the other day —"We are working for a licensing ordinance and installation code in our city. When we get these in operation our troubles will be over."

We disagree.

And we feel that we have some basis for disagreement, for we have studied licensing and installation codes for six years with an eye to discovering faults as well as advantages.

American Artisan first suggested licensing ordinances and codes of installation in the August 17, 1931 issue. We suggested this method of control after months of study on effects of licensing in other industries. We have had no reason for discarding our first suggestion in the years since.

Nor has our campaign for licensing been haphazard. In editorials and reports of progress we have keep the industry informed during these six years of all changes in thought; of problems which have arisen; of dangers which must be met with forcefulness. We have published codes now in operation in several cities. We have gathered a file of all codes available and disseminated information to all who asked for it.

It has been encouraging to see associations and groups of contractors here and there accept our suggestions and begin the long task of formulating a code and setting the stage to secure passage of the necessary local laws. Today the trend to legitimate control over dangerous practices seems definitely established.

But we repeat here, as we have many times previously, that passage of licensing ordinances and codes of installation practice is **not** the end of the battle. Laws, left to shift for themselves will never control bad practices as our contractor friend seems to think.

Lest others, who have not thoroughly studied this problem, may have the same feeling, let us point out that to spend time and money to get a code and laws into force and to then sit back in smug complacency is inviting trouble. The United States is "lawed" to death. Hundreds of thousands of laws now stand on our statute books and most of these laws are never used or even heard of. It has been the history of our law making that any law must have consistent enforcement and constant usage if that law is to remain in force.

We have pointed out dozens of time during these six years that no code is any better than its enforcement. No matter how rigid may be the restriction, no matter how detailed may be the rulings —a code will always be violated unless inspection is honest and thorough.

We believe this contractor's thinking is incomplete because he very evidently has overlooked the matter of pricing jobs. While it is true that under a code all contractors must install an adequate job, designed to definite specifications and cannot install a system which fails because too many corners have been cut—no law can make a man ask a price which covers labor, material, overhead and includes a profit.

Two men pricing identical jobs can differ in price if one wants to work for day wages, forgets that it costs him money to keep his shop open and does not care whether he gets a profit.

Education is the only method devised to date which makes a contractor conscious of overhead and profit. And, as one association secretary points out,—"the men don't want to listen to overhead and costs." Here we have stalemate—men must be educated to appreciate overhead and costs—but they won't listen.

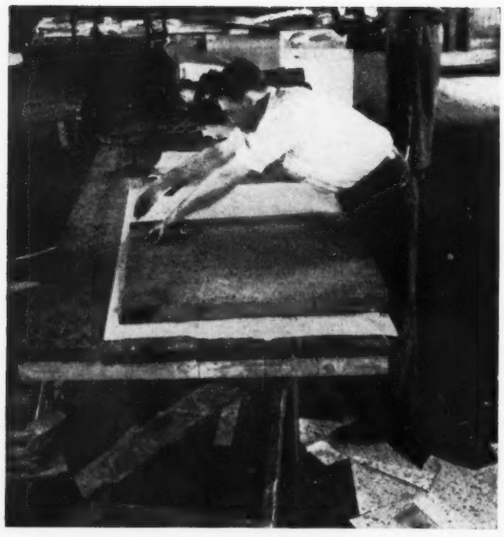
While it may seem that this situation nullifies its own effectiveness, we believe that the problem will tend to work itself out.

How does it tend to work itself out? The contractor who prices work too low has two roads to reduced prices. First he can skin the job and keep some profit. Second he can donate his profit and cost of doing business. With a code we prevent use of the first method, leaving as the only alternative donation of profit and cost.

The contractor operating on this basis, can never become an important factor in any community. He cannot establish much of a reputation because owners tend to shy away from the man always on the ragged edge of bankruptcy. Such a contractor cannot become important because his own labor, at day wages, is all the income he can hope to get. It ought not be too hard to convince owners that such a man is always dangerous; that he cannot and does not give service; that he is here today and gone tomorrow; that there is always the danger of such a contractor cutting corners just to make another dollar or two.

Education applied consistently eventually teaches some men that it costs more to stay in business than the total of labor and material. Some men can never be reached by education—let us hope that these men go out of business painlessly. Of course this program of educating men to appreciate business operation and benefits of a code of laws is a long and arduous process, but time spent raising the general level of our industry and making our own profits more secure is better, isn't it, than time spent—just crabbing?

Scale Pans



Stainless steel sheets are first cut squarely into two pieces (left) to give material for two pans without waste. Then each piece is placed on a padded bench and scratched for cutting from the proper template (above). Note rounded front corners and sloping back corners.

THE Lumm Company of Toledo, Ohio, whose far flung heating, ventilating and air conditioning installations have made the firm known all over the middle west, has developed a line of production items which furnishes day in and day out work for the mechanics and machines of the big shop.

This specialty item is a scale pan, made in several sizes, mostly of 16-gauge stainless steel. These pans are fabricated for a manufacturer of scales shipping his products into every state in this country and into most foreign countries. Orders are received in lots of several hundred pans, of specified sizes, with future delivery dates. The shop starts these orders through as time permits, using this production to fill in gaps in the other work. During some periods of the year, however, the fabrication of these scale pans assumes proportions so large that the whole shop is geared to a production line schedule.

To meet these specifications of time and delivery, the Lumm company has worked out a production schedule, with necessary special tools, machines, dies, and templates which eliminates waste of material or time and assures, on completion, a pan which meets the most rigid inspection. The production can be followed through the shop in the pictures shown here and described as follows:

The 16-gauge stainless steel sheets with a number 4 finish are received crated and stored adjacent to the template bench. As an order starts through the shop these 36 by 75-inch sheets are placed in the power shear and cut squarely in two equal pieces. A heavy padding of paper is then laid on the template bench and the right template for the size on order is laid on the unpolished side. The pan is scratched out wasting only the corners. These particular pans have a slightly sloping back and rounded front corners and have an open front end. The template marks the right corner cut for the two back corners and marks the rounded front corners with excess material for turning into a stiffening fold.

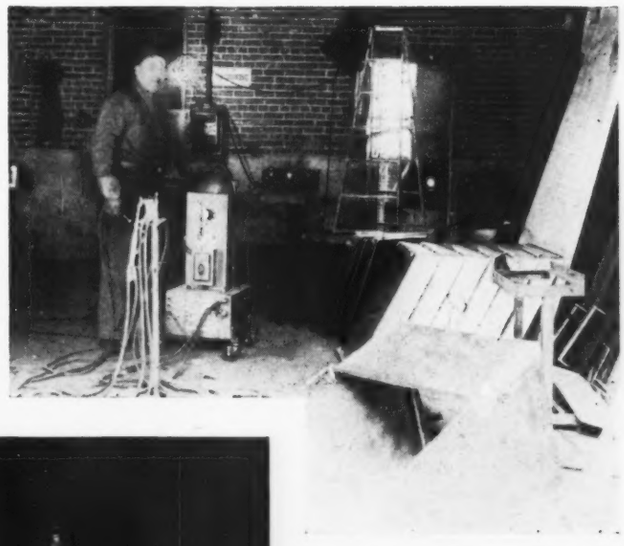
The marked sheets are then taken to a power press where special dies cut out the four corners. Before the dies were perfected, these corners were cut out in a lever slitting shear. The notched sheets then go to the power rolls where the surplus edges of the sides, back and front, are folded back for stiffening. The sheets then go to the power forming press where dies turn up the two sides and back to form the pan.

At this stage the pans are formed and are ready for welding the corners. All welding operations are carried on in a special room and on special frame jigs which have been developed to hold the pan in the most convenient position for the welder. Elec-

tric arc welding is employed, as this type of welding has been found fast and economical. Welding rods of the correct analysis for the stainless steel are used to get smooth welds without any porosity in the weld. A welding machine with a capacity of 100 amp. is employed.

With the pans formed and welded the final operations are grinding and polishing the welds. Special grinding and polishing tools have been developed for this operation. The first and rough grind is done with a 120-emery wheel about 2¾ inches in diameter. This wheel is operated on the end of a flexible shaft from a portable grinder. The rough weld is ground down at this stage, the wheel permitting grinding of the entire weld excepting the bottom corner. A special cone wheel, also of 120-emery, is used to grind down the corner.

In order that the weld and adjacent metal shall be uniform in smoothness and appearance a third grinding wheel of cylindrical shape is next used to smooth off all surfaces within 2 inches of the weld. When this third grinding operation is completed, on both sides, the pan is smooth to the touch and the weld cannot be detected except for the whirled appearance of the corners.



Above—View of the welding and finishing room showing an order of pans formed and ready for welding and a special heavy black iron welded breeching section in the foreground.

Below—Mechanic is locking corners and turning edges of a special aluminum basket. Center—The scale pans are welded with the electric arc. The pan is placed upside down on a special jig which holds the pan in correct alignment and carries away heat.

The grinding wheels are then replaced by a buffer and polisher, which is a wide wheel about 2½ inches in diameter and built up of compressed layers of buffing cloth. The weld and adjacent metal is buffed thoroughly to remove all grinding marks and the final polish is given by applying lime on the buffer.

A final and minute inspection is then given each pan to detect any scratches or imperfections in fabrication. Pans which pass inspection are wrapped to prevent scratching and are ready for shipment to any part of the world.

The attention to details and the special tools and equipment developed, have more than repaid their cost. When production of these pans was first begun, rejects were a part of every day's operations. Today, as a result of this development work, not one pan in several hundred is rejected for fabrication faults.

Some of the pans produced are manufactured from aluminum sheet. The production schedule is not altered materially for aluminum excepting for

Left—Final polishing with the buffing wheel on the flexible shaft. This buffing removes every trace of forming and welding. Center—Using the disc grinder which removes marks of the corner grinders and makes a strip about 2 inches wide uniform in appearance. Right—The bottom corners are ground with a small cone wheel.

substitution of aluminum welding rod, reduced pressure on some of the power machines, and a somewhat shortened time period required for finishing.

The Lumm shop is one of the largest and best equipped in Ohio. Large contracts—either in ventilation or air conditioning—have been a specialty for many years and to handle this class of work modern machinery has been purchased consistently as improvements have been made. Industrial fab-

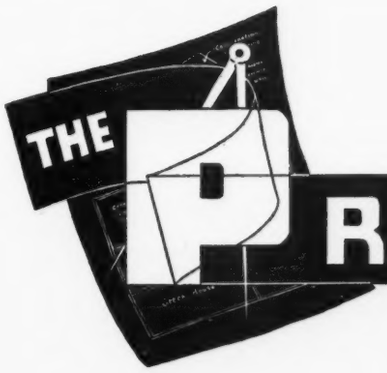
Accessories used on flexible shaft to finish welds. In center is the first grinder, the corner cone grinder, the disc finisher. Also the buffer and lime block.

rication of special items has been a constant operation of this well-equipped shop. Special fabrication in heavy galvanized and black iron, aluminum, all types of stainless steel and plate down to 10 gauge is sought from industrial plants requiring items which cannot be fabricated within the factory or where a special technique is required.

Recently a special commercial air conditioning department under a trained engineer has been set up to handle the franchise of a large air conditioning equipment manufacturer. This department has paid particular attention to small commercial air conditioning—shops, stores, offices, industrial departments, public buildings, theaters and so forth. Since this department has been in operation a number of outstanding installations of this type have been sold and installed without any engineering assistance from the manufacturer.

The Lumm company was started some 35 years ago by C. F. Lumm, who still takes an everyday interest in the organization. A. H. Lumm, the son, is now general manager and active head of the firm and his son is now beginning with the organization.

Heavy aluminum perforated rolls punched, rolled and riveted to castings made as a special industrial order.



Your comment or experience is invited.

PROBLEM CORNER

Metal Deteriorates

American Artisan:

We have replaced three number 16 gauge galvanized iron air conditioning units, size 48 by 27 by 54 inches with 40-ounce cold rolled copper. These units are used in banana rooms in a warehouse where bananas are stored in shipment. There are three more of these units needing new housings.

The question has arisen, "Will the electrolysis set up by the action of the water sprays be detrimental to the copper?" An official has declared that he does not believe the copper will last more than three years—the galvanized iron lasted six years. What should be the life of the copper?

J. G. C., New Jersey.

Reply by
The Editors

Because the problem presented in your letter of January 23 is somewhat outside of our own experience, we have called the local office of commercial conditioner manufacturers and put the problem up to them.

They reply that ordinarily copper should outlast galvanized iron by a considerable percentage, but agree that in view of the fact that the conditioning units lasted only six years, there must be an acid condition in either the water or air or both and if this is the case, it is extremely difficult to predict the length of life of copper.

Furthermore, if we assume that an acid condition exists, then any copper which is used must not be connected to galvanized iron in those parts of the unit where acid air or the acid water or both will come in contact with both metals.

Both manufacturers suggest that if copper is used, the entire unit should be built of copper and that for safety, combinations of the two metals should be avoided. We presume that you are already following this procedure.

You do not indicate in your letter whether water or brine is used as the cooling medium, but if you are using water then the air or water must be contaminated with sulfuric acid from smoke or some other product which is deteriorating the metal rapidly.

You probably can secure an analysis of the air or water or both from some chemical research laboratory. If you care to submit any additional data, we shall be glad to do our best to secure more information.

◆

Air Circulation and Combustion

American Artisan:

Do you have any information showing the effect of poor combustion on the circulation of air in the casing of a warm air furnace using coal and natural draft? It is my belief that when combustion is poor, due to lack of draft, that the circulation of air is seriously retarded because the temperature of the fire has to be so much higher to produce a hood temperature high enough to supply the demand on the furnace. The excess radiant heat from the firepot under these conditions tends to retard the flow of incoming air. I also believe that poor circulation is responsible for broken firepots, because I have found so many cases where the draft was good and the furnace in good condition using basement air the firepots were good, while on furnaces having a good supply of return air and poor draft the firepots cracked in a short time.

C. J. F., New York.

Reply by
The Editors

First of all, it is true that combustion plays a very important part in the velocity of air circulation through a furnace casing. If you have poor combustion and therefore low temperature heating surfaces, it is practically impossible to secure satisfactory air circulation even though the supply and return may be properly sized and balanced.

You understand, probably that air flow ratings for gravity operation are based upon register air temperatures of 175 deg. which means temperatures of from 185 to 210 deg. in the bonnet. It is necessary, therefore, to have sufficient heating surface temperatures to supply 185-210 deg. bonnet temperatures before your plant can operate according to the designed rating of the gravity code. Of course, air does circulate at lower bonnet temperatures, but the whole code is based upon the 175 deg. register temperature and pipes are sized accordingly.

With respect to the effect of different heating surfaces on air flow and velocity, the University of Illinois has established (discussed in Bulletin 120) that the efficiency of the furnace is decreased and the capacity is also decreased when the upper heating surfaces are higher in temperature than the lower heating surfaces. In other words, the greatest capacity for a given furnace is obtained when the highest temperatures are in the firepot section and lower capacities are obtained when the radiator is higher in temperature than the firepot section. This is only for gravity flow.

The University recommends that every attempt should be made to have the air arrive at the bottom of the interior casing as cool as possible and to have the lower heating surfaces arranged as effectively as possible so that the air may receive its heat at as low a plane in the furnace as practicable. You should remember that return air openings into the casing should in all cases be lower than the grate level of the furnace, and a boot whose top enters the casing above the grate level is an inefficient boot.

We do not see why there should be a difference between casing air velocity for closed returns or basement returns to the casing as the velocities and capacities will depend upon the difference in temperatures obtaining and the suction effect of a volume of warm air which in turn is determined by the height of the registers above the bonnet and the efficiency of the casing construction.

Following is some data from Bulletin 112 bearing on air flow at different combustion rates:

TESTS

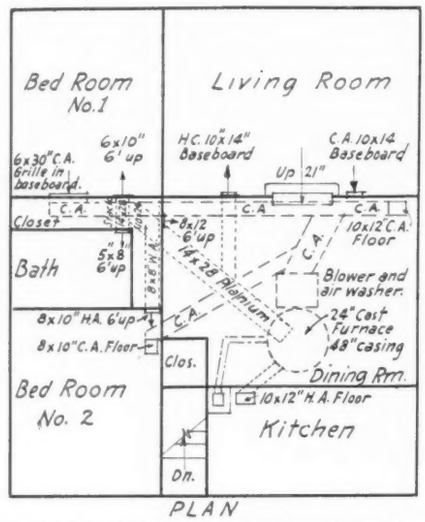
	A1	A3
Duration of Test	12 hrs.	9.5 hrs.
Av. Reg. Temp., deg. F	169.4°	197.7°
Rate of Combustion lb./sq. ft	4.23 lbs.	6.16 lbs.
Av. Return Air Temp., deg. F	84.6°	76.6°
Av. Bonnet Temp., deg. F	181.5°	210.7°
Wt. of Air entering Return per min., lb.	60.15 lbs.	68.30 lbs.
Wt. of air leaving register per min., lb.	59.76 lbs.	71.16 lbs.

The Problem Corner . . .

Register Dirt

American Artisan:

Enclosed is a sketch of a house heating system in which we are experiencing trouble with dirt issuing from the registers. This is a new house in which the system pictured was installed last fall. So far as heat is concerned, the system is more than satisfactory, but the registers in every room, except the living room (which is 21 inches lower than all other first floor rooms) are passing black dirt which is playing havoc with the decorations.



PLAN

Room	C.C.	Glass	Wall	Cfm.		R.B.F.
Living	2200	60	222	208	Ceiling figured Floor not "	16.9
Bed Rm.1	1140	55	154	149		12.1
Bath	350	12	33	40		3.2
Bed Rm.2	1470	40	212	130		10.6
Dining	1890	26	100	119		9.7
Kitchen	1125	40	290	141		11.5
				787		64.0

Register Temp. 140 F
F.p.m. 500
Furnace stat in Plenium set at 165 F
(No thermostat, hand fired coal)

Blower rated 1300 c.f.m.
12" " wheel
10" " pulley
3" Filters
Air washer louvers W. shaped, spaced 1" apart.
¼ hp. motor, adj. pulley.

There are three filter sections which should catch all dirt passing through the blower. Note also that there is a washer used with the blower, which should add further to the cleaning ability of the system. So far as we can judge the system is absolutely tight all the way through.

H. D. W., Georgia.

Reply by The Editors

With reference to your problem of the heating system passing back soot or dirt, we are at a loss to account for this situation, but we can offer the following suggestions which might be looked into:

1. We take it that you probably are using a unit with sprays and filters so the only possibility of passing dirt by the filters in this unit comes about when there are open spaces between the filter sections or between the filter edges and the metal housing. He suggest that you seal all such spaces with adhesive tape or paper.

2. However, if air is passing the filters, you should find dirt at all registers excepting that the dirt may not move up the stacks to the high sidewall registers and to check suggestion No. 1, we suggest you remove the boot at the bottom of two or three registers and if you find dirt in the boots, it is possible that the dirt is passing by the filters.

3. If condition two does not exist, then our only other suggestion is that some of the air entering the plenum is picking up dirt from the smoke pipe connection in the furnace and because of air flow currents in the plenum some of the branches are carrying dirt from the collar.

4. This condition might be inspected by using No. 2 suggestion.

◆

Balancing Heating Systems

American Artisan:

What is the best method to use to balance a mechanical warm air heating system? The layout was prepared by the manufacturer's engineer and installed accordingly. The owner has been having trouble keeping some of the rooms warm enough, especially the bath room on the second floor and one of the bedrooms on the same floor. The bathroom generally is 5 degrees cooler than the remainder of the house whereas it should be 5 or 10 degrees warmer. The run serving the bathroom is at the tail end of the basement main. All mains and branches are rectangular. The furnace is equipped with a stoker.

We will also appreciate any suggestions for controlling the blower and at what temperatures this fan switch should be set. Would a vent from the bathroom relieve any pressure in the room?

A. B. DeB., Arkansas.

Reply by The Editors

A common procedure for balancing heat supply is to set all dampers in branches so that the proper number of cubic feet of air per minute is delivered from each register in accordance with the design taken from the data sheet.

We believe, however, that a much more satisfactory method is to balance the rooms to temperature, because, after all, temperature is the thing we are after and whether or not a satisfactory temperature requires more or less c.f.m. is immaterial.

The method we suggest employs the use of as many thermostats as there are rooms in the building. You can purchase thermostats from the ten cent store providing you can move the mercury tube up and down so that all thermastats will read alike when placed side by side. We suggest that one thermostat be placed in each room at about a three foot level, preferably near the center of the room or toward a cold wall, if one exists. Balancing should be done on a typical Winter day. In other words, if your average Winter day is fifteen degrees above zero, choose such a day and set your thermometers throughout the house. Start the fan and have a brisk fire in the furnace so that you can maintain a fan operating bonnet temperature.

Then obtain from the owner the temperatures he believes should exist in each room, and set the dampers in the branch ducts until this temperature is obtained in the various rooms.

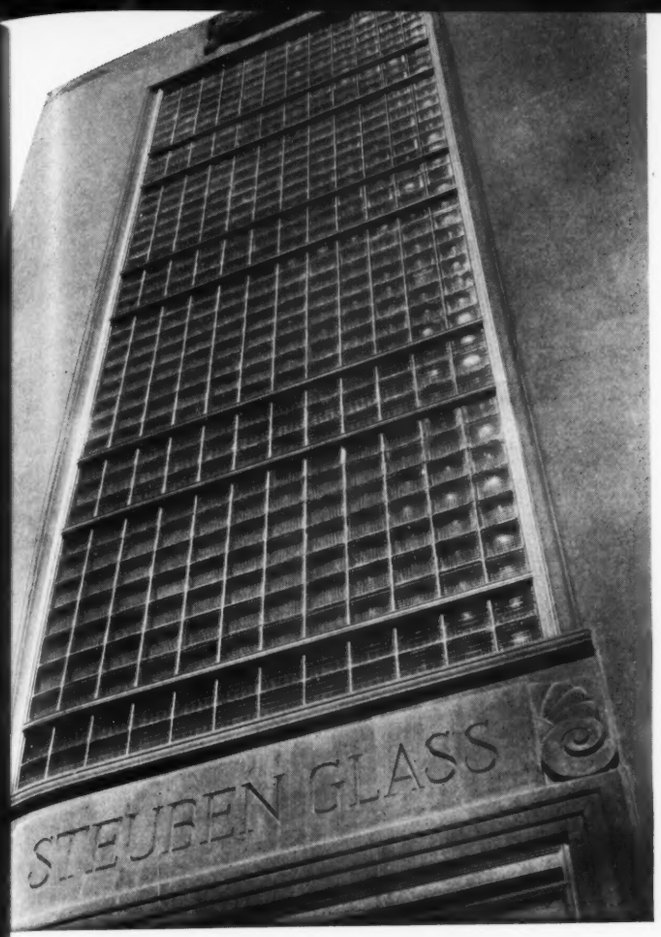
You will appreciate that a test of this kind presupposes that the heating plant is adequate in size; that the fan will deliver sufficient volume of air to hold the temperature; and that all piping is sized so that the necessary amount of air can be delivered to each room.

If the stack to the bathroom described in your letter is not large enough, or if the basement pipe to the bathroom stack is too small, you may not be able to maintain a satisfactory temperature in the bathroom without resizing the basement pipe or stack or both.

If you are not able to maintain temperatures desired, at the present speed of the fan, it may be necessary to change the fan or motor pully to deliver more air.

Also it may be necessary to raise the bonnet temperature and with a stoker you should have no trouble in doing this. If your fan operating differential is now say 150° on to 125° stop, you may find it necessary to raise the differential to 175° on to 150° stop. Probably the stoker has several feed ranges and by increasing the feed, you can raise the bonnet temperature.

In view of the fact that your bathroom stack comes off the end of the basement trunk, you may have had appreciable temperatures drop through the duct so that you will have to both increase the bonnet temperature and increase the blower capacity.

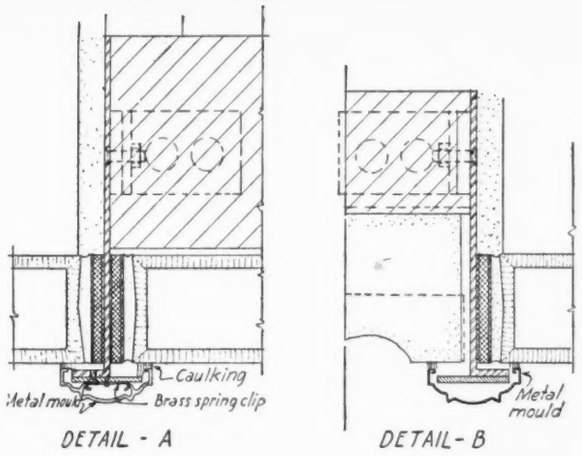


House of Steel and Glass

Nearly 4,000 glass blocks have been used in the outer walls, with fibrous glass insulation packed about the framework. The exposed walls of the office section are approximately eighty per cent glass block while the interior walls are of glass block arranged in suitable panel sections.

Nickel-silver, a natural setting for glass construction units, is an alloy highly resistant to corrosion and tarnishing. Its physical and mechanical properties are measured by the nickel content, which ranges from five to thirty per cent. Thirteen per cent nickel is being used for the Corning building.

The details in the drawing show how the metal is applied for the rails, stiles and mullions. Roughly, the structural frame is projected out through the rows of block by means of angles or bars to which are screwed, riveted or welded cross members around which the spring clips of the metal sections are applied.

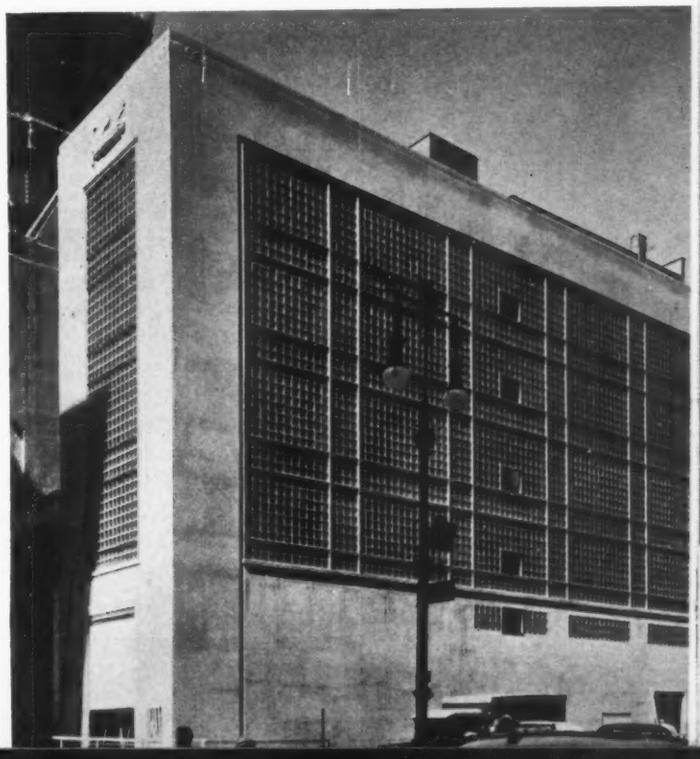


DETAIL - A DETAIL - B DETAIL - C DETAIL - D

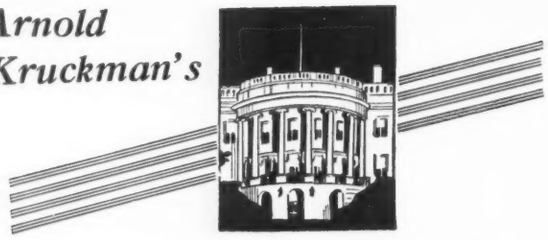
NEARLY a quarter of a mile of nickel-silver, measured in total footage, provides a handsome exterior trim for New York's first glass office building, now nearing completion at Fifth Avenue and 56th Street, the metropolitan home of the Corning Glass Works and two subsidiary companies, Steuben Glass and the Macbeth-Evans Division.

Fifth Avenue's "House of Glass" is the first instance of record where nickel-silver has been used as a trim for a glass office building. According to the contractors, 3,640 pounds of this silvery metal—an alloy of nickel, copper and zinc, has been placed on the outer walls and a somewhat greater quantity is planned for the interior of the building.

The Corning building, which was designed to demonstrate the virtues of glass block construction, will do without windows and will be air-conditioned throughout, thus eliminating heat, dust and noise.



Arnold Kruckman's Washington Letter



IN his last national chat over the radio the President told us that he had called the special session of Congress to consider legislation to improve the condition of labor and farmers, to organize more public works in seven different regions of the United States, and to reorganize the Government of the United States. His chat completely ignored any mention of taxes, but through James Roosevelt and Marvin McIntyre and Stephen Early, the White House secretariat, it was allowed to sift out that the whole tax discussion would be deferred until the regular session in January.

There are many indications that this tax debate may get beyond the control of Mr. Roosevelt. Farm legislation, by resolution, comes first at "the next session"; and the wage-and-hours bill apparently is equally important in the Administration program; also, the "gentlemens' agreement" in the Senate requires that the anti-lynching bill be considered as soon as the farm bill is out of the way. But the universal interest in the whole business of taxes is so demanding that it is quite possible the well laid plans of "mice and Presidents may gang agley."

Means More Money

After all, the various legislation proposed means the expenditure of more money. It is conservatively estimated the farm legislation will require at least one billion dollars in expenditures a year. Some one has unofficially estimated that the new public works in the seven regional TVAs will cost, as a starter, at least three billions. Without going into the details of the potential Government budget, it is clear almost any new legislation means some way, somehow, somebody will have to find a way to pay the bills.

The means may be available in the Treasury. It may be simply a matter of switching funds from one account to another. But there is an uneasy feeling among many harrassed taxpayers that the practitioners of high finance may not be able to find the money by such easy technological means. Out through the country, West, East, North, and especially South, folks are insistently sending interrogations to the Capitol about the prospects of more or less taxes. Apparently the mass of smaller business people, and people of moderate means, are infinitely more interested in this tax problem than in any other problem now before the voter.

Effect of Tangled Taxes

Here in Washington you realize that people everywhere in the United States optimistically hope we are not in a slump. But at the same time they are not hypnotizing themselves to oblivion of the fact that some sort of slump is here. And apparently people feel there is some relation between this paralysis of business and the tangled tax problem. More and more, as time goes along, business men express increased exasperation over the capital gains tax and the undistributed profits or surplus tax. Many attribute some of the stock market debacle especially to the capital gains tax. This tax, of course, operates to take out of any returns you get from the sale of capital equipment, buildings, real estate, or stock, the same exaction as would be taken from any regular income you might earn. The effect on the stock market comes by reason of the fact that the big traders are reluctant to sell on a rising market, and unload as fast as possible on a falling market.

Undistributed Tax Load

According to the financial agencies, the undistributed profits tax has been most hurtful to the smaller business interests. The large corporations have accumulated surpluses and are able to stand the strain. But the smaller business has not been able to cushion itself against this depletion of its surplus, and so it has no margin for improvements, nor for replacements, nor for any expansion that appears logical.

This effect was not, probably, what FDR and his counselors sought to accomplish, but, on the whole, it was not unlike their purpose. The chief purpose of the undistributed surplus tax is to force these funds into circulation by getting them into the hands of the stockholders as dividends. It is assumed this liquification will give the Government a larger cut in taxes, and will cause the funds to be spent more widely. Wider circulation of all funds, either directly, or through the channels of Government, is the main object of the New Deal tax program. It appears to be the purpose of Mr. Roosevelt to blast out of their hiding places all petrified fortunes, large or small, and to put them to work, especially where they will quicken the life of what he calls the "submerged third."

The other day he was very careful to make clear that he was less interested in ameliorating the troubles of the business people who were stymied by the undistributed profits tax and the capital gains tax than to improve the fortunes of the thirty or forty millions who he says are living in substandard conditions.

To many observers here it

seems increasingly clear that Mr. Roosevelt has not given a fraction of an inch in his effort to renovate the socio-economic system of the United States. If appearances are not deceiving, the plan remains to level down individual accumulation of wealth, and to distribute that wealth in small separate bits widely among all the people of the United States.

And Now Collectivism

Obviously that is the sacrifice of the individual for the mass. That is the essence of the Asiatic social philosophy. That is the core of the impulse that drives the Japanese and the Chinese to give up their lives in droves. The idea came into the individualistic West by way of the various Slavonic nations, who probably by reason of their more or less remote Asiatic origins or connections, are naturally sympathetic with this form of collectivism. As the picture here is more sharply etched by the conflicting forces one wonders how these dominant notes will blend; and we understand why business, as it was done at the old stand, is bewildered and at sea in the emerging new surroundings. The special session should be watched with close interest. It may make history of epical proportions.

Undersecretary Roswell Magill of the Treasury, one-time professor at Columbia University, a theoretical expert upon matters of taxation for the past year, with other Government technologists, has been making a survey of our tax structure. On the opening days of the special session the report will be in the hands of the Joint Committee of Internal Revenue Taxation, composed of members of the House Ways and Means Committee, and the Senate Committee on Finance. The contents of that report have been jealously guarded. It is fairly well understood, however, that there is no inclination to change the capital gains tax. There may be recommendations to make slight modifications in the undistributed profits tax so as to enable the business man to retain a percentage of these profits to pay debts, and to make urgent improvements.

Tax Government Bonds

Prof. Magill also has let it be known that he believes Federal, State, and municipal bonds should be taxed. It is estimated these bonds, aggregating over $70,000,000,000, will bring in a revenue of approximately $500,000,000 annually. The professor is not so enthusiastic about taxing the payrolls and annual overhead of Federal, State, municipal, county and district governments, totalling $20,000,000,000 a year.

It is also quite certain that a "broadening of the base" of taxation will be urged. That is merely a smoother way of saying that people with very small incomes will be included among those taxed. It is quite certain that workers earning $800 per year will be taxed, and it is not improbable that the lowest taxable income may be down as deep as those who receive $600 per year.

To make certain that all taxes are gathered, the employer will be made responsible for the collection. Taxes on all salaries and wages of $5,000 or less are to be collected by the employer. He naturally must be the bookkeeper and the agent for the Government. The work and expenses are not reimbursable. It has even been suggested that the methodology of the Carriers' Tax Act might be followed, which provides that, in addition to acting as collecting agent for the Government, the employer must pay an excise tax of 3½% upon the salary or wage of each employee. If this tax system is adopted, added to the social-security taxes and other taxes already imposed on pay-rolls, it is estimated the 5,000,000 employers now paying such taxes to the Government, will then annually be handing to Uncle Sam between 20% and 25% of their payrolls.

Tax the $3,000 Income

It has also been suggested that all incomes exceeding $3,000 per year should bear surtaxes, the surtaxes to increase with each $1,000 of income. If some of the plans discussed are adopted, incomes over $1,000,000 or $2,000,000 per year would to all intents and purposes, be confiscated. Inheritance taxes undoubtedly will be increased, if the Administration plans are passed by Congress. And so far as it is necessary to balance the budget, without materially increasing the size of the budget, and to pare the public debt, which now stands near $40,000,000,000, Congress and other elements in the Government, will cooperate in making new tax plans effective.

But the plan to level down business, to finance non-durable public works for the benefit of the submerged third at the expense of business and other taxpayers, is not so popular within the Government itself. Congress unquestionably will resist the plan, and it is known that the Federal Reserve Board, and Jesse Jones of the Reconstruction Finance Corporation, and Joseph Kennedy, and others, believe that industry should be permitted more freedom. Unlike FDR most of these men do not believe in a sales tax. In some quarters of the Government the soaring cost of commodities is attributed to higher wages and shorter hours which are held to choke the heavy industries and to have throttled the building boom. These rather old-fashioned business realists feel that labor as well as management should share the responsibility for stabilizing recovery.

It may be interesting to know that most of the President's tax philosophy is supposed to come from David Cushman Coyle, an official in the Natural Resources Board, who has that "perfect passion for anonymity" so highly praised and much desired by FDR. Mr. Coyle is a quiet, scholarly liberal of the left wing. He has written a number of pamphlets which have had a tremendous circulation. The latest "Why Pay Taxes?" is the epitomization of Mr. Roosevelt's current tax ideas.

An Exhaust System for Strip Tanks and Acid Crocks

By R. F. Jeske
Milwaukee, Wis.

THIS article covers an exhaust system for a so-called strip tank, acid crocks and a rinsing tank, all grouped together in approximately the center of this establishment. Air is received from the shop surroundings and sufficient air filters in at windows and doors to supply the shop.

Overhead Hood Not Possible

As material is handled in and out of the tanks and crocks an overhead hood is out of the question and even if this were possible, it should not be used, because then the injurious fumes would be drawn toward and over the employes, endangering their health.

Asbestos Slotted Suction Box

For this reason a so-called slotted suction box was used as per illustrations. Note that the east side is favored on air intake capacity. This was done because the fumes emanating from the crocks containing sulphuric and muriatic acids are the most injurious and greatest in volume. There are also slots on the one end of the box facing the rinsing tank. Since sheet metal, except lead, does not last very long under these fumes, this box, and all ducts leading to exhauster, were made of ¼ in. thick asbestos, the cross section of the box shows the manner of constructing joints, etc. and the joints in the ducts were made in a similar manner. The inside of the exhauster, including the wheel, was painted with asphalt for protection.

Suction and Air Capacity

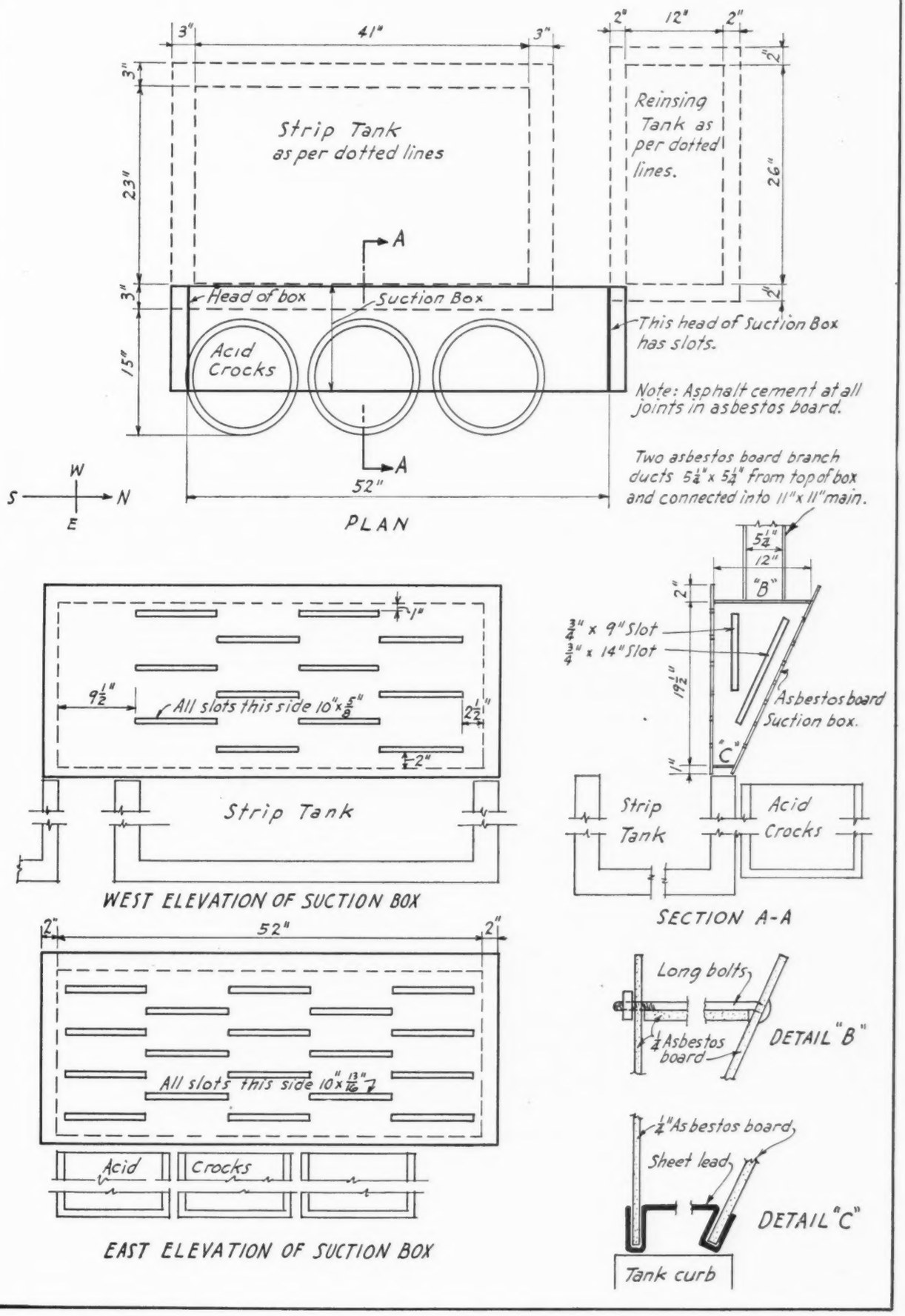
There are various methods of determining the amount of air to be drawn in by this system. For comparison only, if an open, overhead hood were possible, it would have to be about 65 in. x 65 in. in size including the required projection beyond tank edges. The area of a hood of this size is about thirty square feet and at 100 fpm velocity, 3,000 cfm would be required. Considering the tank and acid crock area only, there is about twelve square feet and at 250 fpm velocity, requires 3,000 cfm. The suction box, with slotted air intakes employed in this installation, is the most effective as well as economical, as only a total of 1,650 cfm is required.

In checking the drawings note that slots on the west side of box have 75 square inches of area; on the east side 146 square inches and the end slots have 17 square inches. A total of 238 square inches or 1.65 square feet. Holding a velocity at the slots of 1,000 fpm, we arrive at 1,650 cfm. If desired, round holes could be used instead of the slots, but of course of the same square inch area.

State Law Requirements

The state laws in which this job is located, require not less than two-inch water gauge suction in branch pipes leading from the suction box. In this case two branch pipes were used, 5¼ in. x 5¼ in. each and at the suction mentioned will take in 825 cfm each or a total of 1,650 cfm for both branches. Since the State law requires the two-inch suction only in the branch pipes and within twelve inches from the hood or suction box, the velocity in the main pipe leading to and from the exhauster, was reduced to 2,100 fpm and for this velocity the main pipes were made 11 in. x 11 in. This velocity is sufficient to move the fumes and reduces motor horsepower to considerably less than if the high velocity of the branch pipes were continued through the main pipes. Although the State law requires two-inch suction, calculations were based on 2.2 inches. Tests were made after installation and the performance is very good; all fumes removed as they leave the tanks and crocks.

A 1½ H. P. motor is handling this job and is connected to the exhauster by two V belts.


3"
41"
3"
2"
12"
2"
Strip Tank
as per dotted lines
Reinsing
Tank as
per dotted
lines.
23"
26"
A
Head of box
Suction Box
This head of Suction Box
has slots.
Acid
Crocks
15"
Note: Asphalt cement at all
joints in asbestos board.
A
52"
Two asbestos board branch
ducts 5¼" x 5¼" from top of box
and connected into 11" x 11" main.
W
S
N
E
PLAN
1"
9½"
All slots this side 10" x ⅝"
2½"
2"
Strip Tank
WEST ELEVATION OF SUCTION BOX
5¼"
12"
"B"
2"
¾" x 9" Slot
¾" x 14" Slot
19½"
Asbestos board
Suction box.
"C"
1"
Strip
Tank
Acid
Crocks
SECTION A-A
2"
52"
2"
All slots this side 10" x 13/16"
Acid
Crocks
EAST ELEVATION OF SUCTION BOX
Long bolts
¼ Asbestos
board
DETAIL "B"
¼" Asbestos board
Sheet lead
DETAIL "C"
Tank curb

A Dust Flue Pattern

By L. F. Hyatt
Canton, Ohio

American Artisan:

I wish to submit a pattern problem which has me stopped. I have been called on to make a flashing or rain proof for a dust flue on a cotton gin. The details are as follows:

The flue will be placed on the ridge of an intersecting ⅓ pitch roof, or in other words two roofs join at right angles and the dust flue comes in the valleys of the intersection. The flue will be out of center in both directions. I am inclosing a sketch to illustrate possibly to a better advantage.

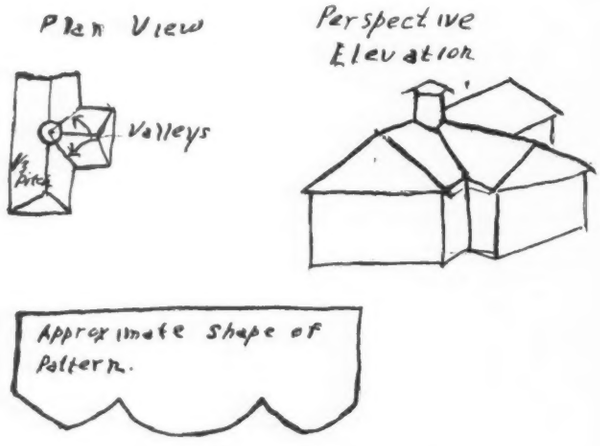
The dust flue is round—37 inches in diameter—and comes through the roof at the intersection for the two gables. This makes it necessary to make three ridge cuts and two valley cuts. In my efforts to effect this layout, I got the ridge cuts easily, but the valley cuts came out round instead of pointed. I would like patterns for both the pipe and the hole in the flange.

W. S. L., Oklahoma.

THE problem for developing the pattern for a dust flue on a ⅓ pitch roof, Fig. 1, should be begun by finding the true lengths on the valley lines as this was somewhat confusing to our reader.

Begin by drawing the plan, front elevation and side elevation views and step off the sixteen spaces on the circumference of the dust flue as shown on the plan. To find the line of intersection between the roof and flue in the side and front elevation, first draw a horizontal line from point *m* on the plan and a vertical line from *m* on the side elevation, allowing them to intersect at *m'*, and through this point draw the line *c-d* on a 45° angle.

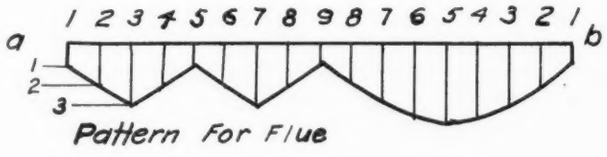
From each of the remaining points found on the circle of the plan view carry lines around allowing them to intersect the roof line as shown. Also drop lines from each point in the plan view, as shown by point 1 in the plan to 1 in the front elevation. A horizontal line drawn from point *6* in the front elevation, intersecting the line carried around from point *6* on the plan view will locate point *6* on the side view through which the curved line of intersection between the roof and flue is drawn.



The reader's sketch of the problem

The invisible intersection line which is shown on the front elevation by numbers *3, 4, 5, 6, 7* is found by drawing horizontal lines from the points on line *m-o* on the side elevation allowing them to intersect like numbered lines dropped from like numbered points on the circle in the plan view. The numbers shown, one above the other of course, represent numbers that are opposite each other on the circle such as *6-4, 7-3, 8-2,* etc. shown on the plan view.

To begin the pattern draw vertical lines of an indefinite length from points *t* and *u* found on the plan

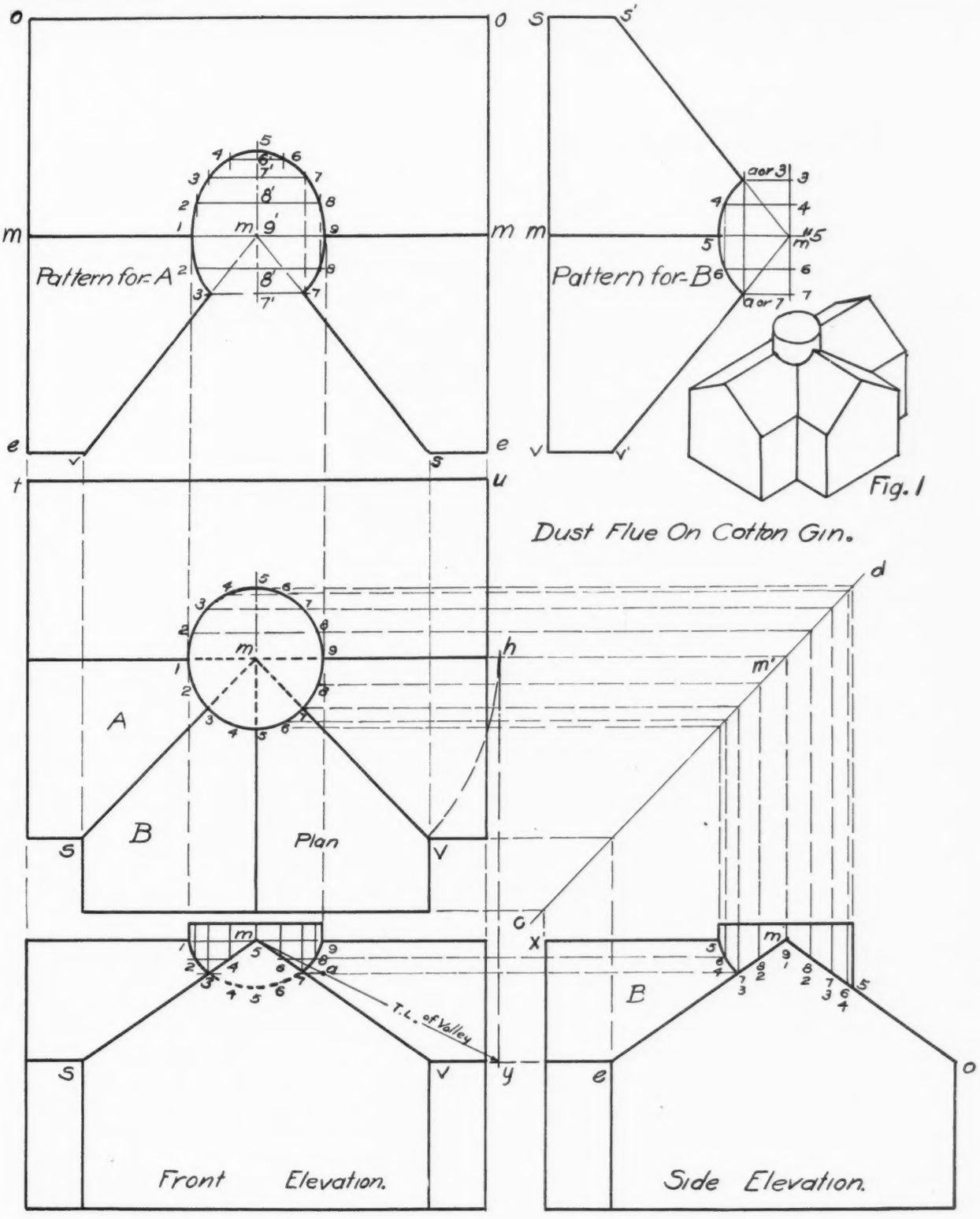


view, and step off distances equal in length to *m-e-o* found on the side elevation, and draw the horizontal lines as shown. Now draw vertical lines from points *v* and *s* on the plan intersecting horizontal line *e-e*. Draw a perpendicular line from *m* on the plan allowing it to intersect *m* on the pattern, and draw lines from *m* to *v* and *s* as shown. This part is cut so as to receive part *B*.

Now through point *m* on pattern for *A*, erect a perpendicular line of indefinite length and upon this line step off the distances *9* to *8*, *8* to *7*, *7* to *6*, *6* to *5*, etc. found on lines *m-e* and *m-o* of the side elevation and indicated by the numbers *9'* to *8'*, *8'* to *7'*, etc. Through these points draw horizontal lines of an indefinite length.

From each of the points on the circle in the plan, draw perpendicular lines intersecting the horizontal lines and locating like numbers, through which the curved lines are drawn as shown, thus determining the size and shape of the opening in the pattern for *A*.

A reliable method for finding the length of a valley is done as follows: Take the radius *m-v* and with *m* as a center strike an arc intersecting the horizontal line



m-m' at h, and from h drop a vertical line intersecting an extension of the eaves line at y. A line drawn from y to m is the true length of the valley from m to 7 which is the point of intersection between the dust flue and valley line.

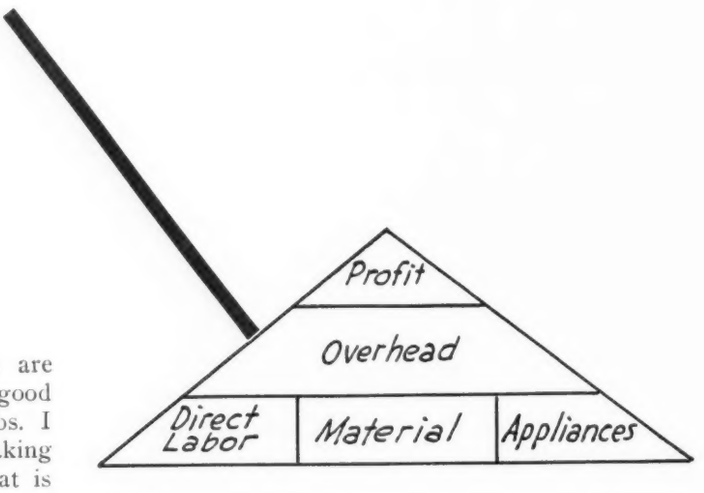
Draw a horizontal line from point 7 on the front elevation intersecting the true length line at a. This distance stepped off from point m on the pattern will locate point 7 on the pattern just as the erection of the perpendicular line from point 7 on the plan did. The latter method is in most cases preferable.

To draw the pattern for B, a perpendicular line is drawn from x, and upon this, lines m-s and m-v found upon the front elevation, are stepped off. Horizontal lines of an indefinite length are drawn from each of these points. A perpendicular line is drawn from point m on the side elevation intersecting the horizontal line

(*Continued on page* 114)

Are YOUR Expenses Under Control?

By Joseph G. Dingle
C. P. A., Ottawa, Ill.



LET'S assume that all our readers are doing a good business; that they are getting good prices; that they know all about estimating jobs. I can hear you saying that everybody is making money if those assumptions are correct. That is where a great many business men go wrong and fail to find the expected profit from their business. There is one place where profits can leak out fast and that is through expenses.

In our October article we discussed sales classifications and before going into this expense problem we would like to answer a question raised by our Editor. He, in editing our Sales Classification article, asks "where should engineering and sales expense be charged on jobs handled through sub-dealers." He says there is a growing number of dealers who take franchises covering a territory and help their sub-dealers in sales and engineering, with the sub-dealer doing the installing. In such a case, we would suggest that two sales classifications be used for Appliances; one for those jobs handled entirely by the dealer, and another for those sub-dealer, or jobbing, sales. As an element of cost of the jobbing sales, we would have the cost of the engineering and sales assistance to the sub-dealers.

While on this point, we would like our readers to present their questions and problems so we can help to dispose of them to the end that we may better serve ARTISAN readers.

Where Is Your Profit?

In our October article, as in others in years past, we have used a design showing the make-up of the sales dollar. We used first a perfect square, composed of four squares, each representing a part of the dollar. Our newer design is, we think, better adapted to the needs of today. It is a pyramid, having as its base Direct Labor, Material and Appliances. On this foundation is laid overhead and then, as the final cap, we show profit. We here reproduce the pyramid and shall try to show what effect uncontrolled expenses (overhead) will have on your business.

In our industry, as in practically all industries, there are a few individuals who claim they have very little overhead; their rent is quite low; they work themselves instead of hiring a man; leaving the impression that by so doing they save the man's wages. There are others who will admit they have overhead and that they are including in the selling price a sufficient amount to take care of this burden and leave a profit. And, to finish the classification, there are a few who know they have overhead; who know its relation to the business done; and know there is an adequate control over expenses to prevent unnecessary costs in this particular part of their business.

Ignorant Competitor Is Dangerous Competitor

At the risk of boring those readers whose records are properly laid out, we want to stress the point that an ignorant competitor is a dangerous competitor. A business man who really knows his costs knows well the truth of this statement. He sees his competitor submitting bids at figures well below cost and he knows that in so doing his competitor is actually hurting the entire industry. If we can help with the education of the competitor, who may really be a well educated and practical man, yet is ignorant from the standpoint of good cost records, we will materially benefit the entire industry and save many from the bankruptcy courts. We will also protect the customers of the industry, in that they will be asked to pay a fair and reasonable price, not one arrived at by guesstimating, rather than estimating. Your competitor has a great deal to do with the prices you get for your work and if he, through ignorance, underprices his work, he puts you on the spot. It is a rare customer who will believe the ignorant competitor is really "giving

him something." The customer will think you are trying to "rob him."

Guard Against Excessive Overhead

How may the typical business man guard against excessive overhead? By properly classified expense accounts, enabling him to know at all times just what he is spending in the several expenses; to compare current expenses with prior months and years, he will be able to quickly catch "run-away" expenses. One of the most efficient profit eaters is that old expense account GENERAL EXPENSE. The typical set of books of yesterday carried more expense as general expense than in any other account. Everything was dumped into this account and, in the end, it was a mess. The modern practice is to have such well classified expense accounts that General Expense is quite a small item—and represents only such rare or seldom recurring expenses as do not warrant a specific account.

Taxes, Advertising, Display

There was a time when a single tax account was sufficient for the typical small business, but today there are too many taxes levied for different purposes and on different bases, some deductible for income tax purposes and some not deductible. Some are levied on property, some on pay rolls, and some on the right to do business. Some are more or less stable and fixed in amount, while others are susceptible to wide fluctuation. You must watch taxes.

Advertising is an expense which produces results up to a certain point, but unless watched and controlled, often leads to trouble. It should be given careful attention and made to produce results. Just because your competitor is running an ad in today's paper is not sufficient reason for you to have one. Advertise your goods and services, and be prepared to back up your advertising with goods and real service.

The appearance of your shop and office is of importance, and it costs money to keep up good appearances. The cost will be well expended if well applied. A little thought on this phase of your business might convince you that you could spend a few dollars to good advantage.

We shall, in December, present a Chart of Accounts and discuss the several accounts there shown. Here we want to stress the necessity of proper control of expenses, or overhead. We have covered this field several times in the past and hope you will pardon us for bringing it up again. The fact is, however, that this subject is so important that every business man should read all he can find on the subject of overhead and its control, and even then he may find it eating his profits.

Overhead Must Fit Sales Volume

Overhead expenses must be fitted to sales volume, and kept that way. Suppose you could rent a building well worth $500.00 per month for only $100.00 per month. You would say that was a real bargain—$500.00 value for $100.00. That's true, but if you wished that location for a shoe shining parlor, $100.00 rent would be more than the business could stand. The total monthly expenses should be first fitted to a normal sales volume, and by increasing sales volume you can increase net profit—provided such sales increase does not cause an excessive increase in overhead expenses. Again, it is often advisable to increase overhead expenses in anticipation of increased sales volume; but if that increased sales volume is not obtained, the increased overhead will consume net profits.

To illustrate, let's assume your business prospects are such as to indicate a sales volume of $24,000.00 for the year; that your cost of sales will average 65% of sales; that your overhead will be around $6,000.00 for the year. We can then set up a predicted showing as follows:

Sales	$24,000.00	100.00%
Cost of Sales	15,600.00	65.00
Gross Profit	$ 8,400.00	35.00
Overhead	6,000.00	25.00
Net Profit	$2,400.00	10.00%

Now, with such a layout, we must proceed to make it work. We first find that we must sell Direct Labor, Material and Appliances costing us $15,600.00 for $24,000.00. We must, then, mark up our cost 53.84% ($8,400.00 ÷ $15,600.00 = 53.84%). This markup will produce the desired $8,400.00 of Gross Profit. But our problem does not end here. We must get the $24,000.00 of sales, costing $15,600.00 and we must keep our overhead at $6,000.00, if we are to have the $2,400.00 profit.

Now, let's continue our illustration and see what happens when expenses run away with us. Let's assume the Sales and Cost of Sales are held to schedule, and overhead climbs to $7,200.00, or just $100.00 per month over estimate. We have:

Sales	$24,000.00	100.00%
Cost of Sales	15,600.00	65.00
Gross Profit	8,400.00	35.00
Overhead	7,200.00	30.00
Net Profit	$ 1,200.00	5.00%

This illustration shows that overhead has consumed one-half of our anticipated profit.

Another illustration: Assume sales dropping to $20,000.00, with Cost of Sales remaining at 65% and overhead held to $6,000.00. We have:

Sales	$20,000.00	100.00%
Cost of Sales	13,000.00	65.00
Gross Profit	$ 7,000.00	35.00
Overhead	6,000.00	30.00
Net Profit	$ 1,000.00	5.00%

Here we have kept our overhead under control —that is, it is $6,000.00 as planned, but our Sales

are only $20,000.00—$4,000.00 below predicted volume, and our profit is only $1,000.00 instead of the hoped for $2,400.00. If expenses had been reduced or held to 25% of sales, profit would have been larger.

Now, let's be optimistic and show sales of $30,000.00, with cost of 65%, and overhead held to $6,000.00. We have:

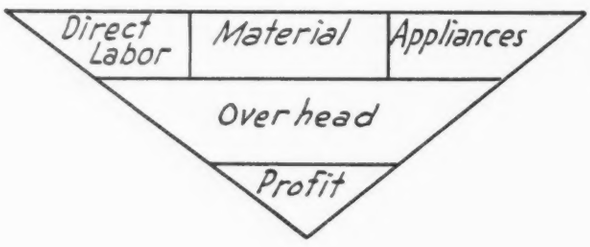
Sales	$30,000.00	100.00%
Cost of Sales	19,500.00	65.00
Gross Profit	$10,500.00	35.00
Overhead	6,000.00	20.00
Net Profit	$ 4,500.00	15.00%

Thus, by increasing sales over our predicted volume, and maintaining your mark-up and keeping overhead at a controlled figure, profits may be greatly increased without increasing cost to your customers. We strongly urge you to study these illustrations, and apply them to your business. See just what you have been able to do in past years and plan for your coming year's operations—UNDER CONTROL.

Now, in a case as illustrated above, if your books were up to date, and your expense accounts were properly classified, you would more easily determine a course to follow whereby you could at all times know just what your month's progress was to any given date, and being forewarned, you could take the necessary steps to protect your profits.

Profit Easily Lost

Profit is the smallest element of the customer's dollar, and it is the first to disappear. Its disappearance is serious. You may stand a few months, or years, of operation without profit, but then what?



As the sales volume decreases, Direct Labor, Materials and Appliances should decrease proportionately. BUT, your overhead does not decrease proportionately. Rent, Telephone, etc., remain stationary and while you may be able to reduce a few expenses, the fact remains that your overhead will consume your profit if sales volume drops below a certain point. Let's assume your business is falling off and that you cannot reduce your overhead below $4,000.00. Using 65% as your Cost of Sales, your gross profit will be 35%. Then:

Sales	$11,425.00	100.00%
Cost of Sales	7,426.25	65.00
Gross Profit	$ 3,998.75	35.00
Overhead	4,000.00	35.01
LOSS	$ 1.25	.01

Keep your expenses under control and if you should find your sales volume dropping, get busy. As is shown above, even though overhead was reduced from $6,000.00 to $4,000.00, a reduction of 33⅓%—it was not sufficient to prevent a loss where sales volume was only $11,425.00 and in spite of the maintenance of your customary mark-up. You should crowd sales all you can, keeping your volume as high as possible; you should watch your costs and keep them within estimates; and above all, you must control your expenses. One way to keep daily tab on operations is to know what your daily production should be, and with our illustrated predicted figures—your daily figures would be: (We use 300 days for a year's business.)

	Year	Day
Sales	$24,000.00	$80.00
Cost of Sales	15,600.00	52.00
Gross Profit	$ 8,400.00	28.00
Overhead	6,000.00	20.00
Net Profit	$ 2,400.00	$ 8.00

Thus, you should have a daily average in sales of $80.00 and an average expense of $20.00 to yield a daily net profit of $8.00. Or let's put it in another way. In order to cover your daily overhead of $20.00 per day at a selling price which carries the 35% gross profit, your daily sales must be slightly over $57.00 ($57.00 × 35% = 19.95 gross profit.) Then, every dollar of sales up to $57.00 per day is needed to pay your daily overhead. No profit is possible until your sales pass $57.00 for the day. But, having paid your day's overhead with the first $57.00 of sales, your 58th dollar carries 35% profit, as does each succeeding dollar for the day. Thus:

Sales	$57.00	100.00%	$23.00
Cost of Sales	37.05	65.00	14.95
Gross Profit	$19.95	35.00	$ 8.05
Overhead	20.00	35.00	
Profit / Loss	$ .05		$ 8.05

Having paid your daily overhead with the $57.00 of sales, the $23.00 extra sales, carrying no overhead, produces a profit of $8.00. Thus, it may be said you break even on daily sales of $57.00, and make 35c on each and every dollar over that amount.

OTE

RESIDENTIAL AIR CONDITIONING SECTION

WITH this issue we bring to a close our discussion of the new technical code. We have taken a plan and designed a complete system step by step. Readers who have questions are invited to write us. Also, readers missing some of the discussion may write for the complete series.

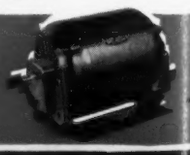
- - - With humidity likely to occupy an important place in the sale of air conditioning apparatus this coming winter, we publish in this issue part 1 of two articles relating the experiences of cooperating contractors in a series of tests with common humidifying apparatus. The results obtained lead us to ask—"Why talk about 40 per cent relative humidity when such is impractical?"

- - - Quite a stir was caused last January over the short cut method of calculating heat loss suggested by E. A. Bailey. This issue contains a follow-up article with additional suggestions.

Uniform

The poplar trees of France—extending in symmetrical rows for mile after mile.

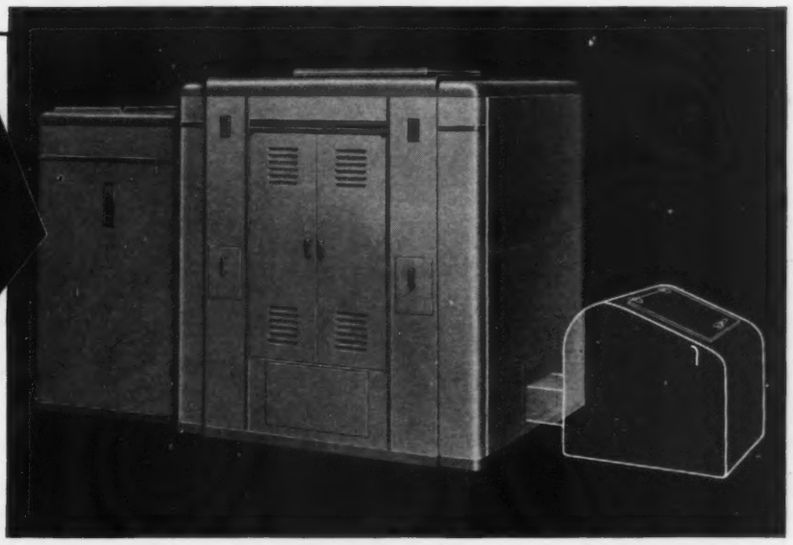
Every Delco motor is built to a single high standard of design and construction. As a result, each provides the same dependable performance . . . the same uniform satisfaction to dealer and consumer alike. Leading manufacturers of refrigerators, washers, ironers, oil burners, stokers and air conditioners know the value of this unvarying quality. They know that it is a real asset to the satisfactory operation of their home appliances. Delco Products Division, General Motors Corporation, Dayton, Ohio. In Canada: McKinnon Industries, Limited, St. Catharines, Ontario.



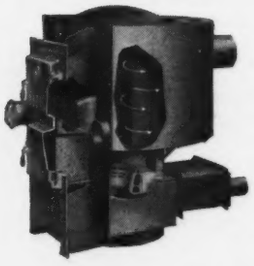
DELCO MOTORS

SUNBEAM ANNOUNCES A NEW STOKER-FIRED AIR CONDITIONER

TO BE USED WITH HOPPER-FEED OR BIN-FEED STOKERS



This illustration shows a Hopper-Feed Stoker connected to the attractive Sunbeam.



Above is shown the riveted and welded steel element, with Stoker connected to rear of Unit. Stoker can be connected to the front, rear, either side, or below the base, of this Air Conditioner. A special clinker compartment, and an unusually large, double radiator which holds several months accumulation of fly-ash, are two noteworthy features.

Sunbeam recognizes the increasing demand for coal stokers and the popularity of stoker firing, with the development of the new Series "S" Air Conditioner, designed exclusively for Stoker-Firing. Bituminous and anthracite coal stokers are equally suitable with this Sunbeam, which has been tested and approved by Anthracite Industries' Laboratory.

The Stoker is *not* furnished with this Unit, to which can be connected any standard make of Hopper-Feed or Bin-Feed equipment.

Handsome appearance—a gracefully proportioned cabinet of 20 gauge furniture steel, with rounded corners, finished in two-tone, glossy green enamel—equals the engineering excellence and high efficiency of this unit.

Capacities range from 100,000 to 200,000 Btu. per hour at the registers. No cutting is required by the installer to connect the stokers. Return the coupon.

THE FOX FURNACE COMPANY : ELYRIA, OHIO
DIVISION OF AMERICAN RADIATOR AND STANDARD SANITARY CORPORATION

SUNBEAM
WARM AIR FURNACES AND AIR CONDITIONING UNITS

The Fox Furnace Co.,
Elyria, Ohio.

Please send me information on (1) The New Stoker Fired Air Conditioner (2) the Sunbeam Dealer Proposition and (3) the name of a nearby jobber who carries a complete stock of Sunbeam Furnaces.

Name_____

Address_____

City and State_____

AA-11-37

HELP YOUR CUSTOMERS ESCAPE FROM THE COLD 70's

AND YOU WILL ESCAPE FROM PROFIT LEAKS ON SERVICE CALLS

Give Them PENN Comfort Zone Control

..MAKE THEM FORGET HEAT CONTROLS

TEMTROL and TEM-CLOCK, twin guardians of comfort and economy do more than turn the heating plant on and off. TEMTROL ANTICIPATES temperature changes. Your customer does not jump up to move up the thermostat. Then down. Then up again. Never quite sure whether or not temperature will remain at the comfort level. Sell uniform temperature for *comfort*...*timed* temperature for *economy* with Temtrol and Tem-Clock.

FREE GUIDE

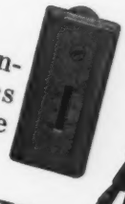
This is the new, improved Home Comfort Guide —a flip of your fingers shows how inside temperatures vary with those outside—but how the "Comfort Zone" is always 70° with your equipment and Penn controls. Mail the coupon.

MAKE PROFITS PERMANENT FOR YOURSELF

when you install PENN TEM-CLOCK and TEMTROL as part of *any* automatic heating system. Be it oil, gas or coal fired, your customers will save you money when they *do not* call for service.

TEM-CLOCK mounted at eye level provides truly deluxe automatic heat. It saves on fuel bills the year around.

TEMTROL mounted at table height anticipates and eliminates temperature changes in the comfort zone.



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Send me (no charge)_____ No. _____ "Home Comfort Guide" moving charts and full instructions for their operation.

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PENN ELECTRIC SWITCH CO.

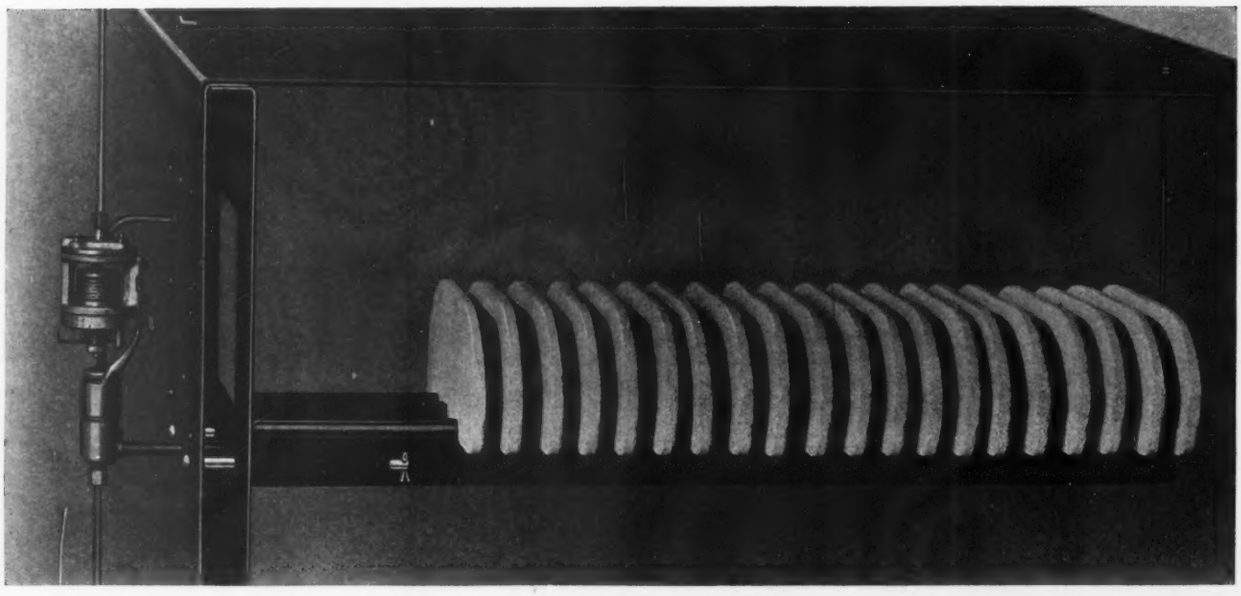
GOSHEN, INDIANA

OFFICES: New York, Boston, Detroit, Dayton, Chicago, Moline, Ill. EXPORT: 100 Varick St., N. Y. C. Distributors in Principal Cities. REPRESENTATIVES: Garland-Affolter Engr. Corp., San Francisco, Seattle, Portland, Los Angeles; Forslund Pump and Machinery Co., Kansas City; The Uhl Co., Minneapolis; Jules Beneke, St. Louis; Monarch Sales, Denver.

AUTOMATIC JUNE

HYDRO-METRIC HUMIDIFYING SYSTEMS

LEADER WITH LEADING CONDITIONER MANUFACTURERS



Air conditioning manufacturers in the front rank are steadily coming to recognize Automatic June as the logical humidifying system for their units. By close comparison and the most searching tests they have proved to their full satisfaction that only Automatic June fulfills the essential requirements of modern humidification. They are realizing more and more that their units can not deliver complete and perfect air conditioning unless complete and perfect humidifying equipment is included; and they are adopting Automatic June to insure one hundred percent satisfactory installations,

Automatic June provides ample humidity in mild weather and with forced air circulation; but graduates it to accord with prevailing weather—thus avoiding weeping windows due to excessive window condensation in severely cold weather. A type and a size to fit every furnace. Manufacturers and jobbers—write for new literature.

BUSINESS OPENER FOR DEALERS

Automatic June gives definite features to talk about—helps to land more orders for complete air conditioning. Ask your manufacturer for warm air conditioning units equipped with Automatic June Humidifying Systems.

MONMOUTH PRODUCTS CO.

1933 East 61st St., Cleveland, Ohio

Send For This Book

"The Science of Re-Humidifying Indoor Air," revised edition just off the press, clearly explains the vital facts bearing on humidification. The most comprehensive work on the subject ever written. Send for your copy today.

ANTHRACITE HEATING NEWS

PUBLISHED BY ANTHRACITE INDUSTRIES, INC.

CHRYSLER BUILDING, NEW YORK

HERE'S A PROGRAM for business building that is paying dividends for heating contractors who have adopted it.

❶ See to it that every property owner and Anthracite dealer in your trading area is fully informed about the Anthracite equipment you sell.

❷ Have your salesmen work in close cooperation with Anthracite dealers, and their salesmen, thus amplifying your own selling effort.

❸ Establish displays of the Anthracite equipment you sell in a prominent display space in your town. If your showroom is out of the way, do as others have done, hire a vacant downtown store, or window, and put in a display.

❹ When selling equipment, point out the economies of Anthracite. The cost of Anthracite has steadily gone down, while oil prices have leaped.

Anthracite is one of the nation's largest industries. It contributes about $155,000,000 to the national yearly payroll. Every ton of Anthracite sold not only adds to the national payroll but also to local payrolls.

● Seventy cents of every dollar spent in the preparation of Anthracite goes into workers' pay envelopes. This is the direct payroll. However, there is also a huge indirect payroll. Steel rails, mine timbers, cars, car wheels and axles, dynamite and blasting powder, sheet steel, and electric power and light equipment . . . all these things take a good percentage of Anthracite income, and spread down into innumerable pay envelopes of workmen who manufacture these supplies. Every ton of Anthracite sold spreads employment to a greater extent than any other fuel.

● With Anthracite, a home owner can choose the degree of fueling convenience he wishes. A simple thermostat, and an adequate Anthracite furnace or boiler, stretches fueling periods to 12 hours or more. Magazine feed boilers need no attention for 24 to 48 hours. Automatic Anthracite burners automatically feed fuel and remove ashes from fall until spring. With all these modern conveniences the home owner also gets the unmatched advantages of Anthracite heat. Economy. Even heat. Clean heat. Complete safety.

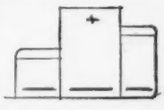
● Even with all the sales activity in Anthracite equipment, the surface of possibilities is hardly scratched. At least 85% of present heating equipment is obsolete. There are millions of prospects for thermostats. One-third of all homes have no facilities for continuous hot water. Get your full share of this profitable business.

● "Double Savings With Anthracite." This sales story makes a powerful appeal. The first saving is the low cost of Anthracite. The second saving is the greater efficiency of new Anthracite equipment, which provides more heat with less fuel. Thus, double savings.

★

Here are reproductions of full page Anthracite advertising constantly aimed at architects, builders and mortgage institutions. Follow up these prospects, they control a lot of Anthracite equipment business

F L A S H



AUTOMATIC ANTHRACITE AIR CONDITIONING

Air conditioning engineers credit Anthracite with solving many perplexing problems of winter air conditioning.

COST. Anthracite's economies bring winter air conditioning within reach of millions.

CLEANLINESS. The cleanliness of Anthracite heat has simplified the air filtering problem. With Anthracite there is no soot to clog filters.

EVEN HEAT. In winter air conditioning there is a constant stream of air to be heated. "On and Off" fuels cause "On and Off" heat. The even glowing heat of Anthracite provides evenly heated air.

Write for names of manufacturers of Anthracite air conditioning equipment.

This Seal of Approval appears on Anthracite equipment, only after it has passed the most rigid tests in the heating field.

ANTHRACITE INDUSTRIES approved INCORPORATED

Pennsylvania ANTHRACITE COAL

● "Pennsylvania Anthracite Coal" and the slogan "The Solid Fuel for Solid Comfort," appear in all consumer advertising of Anthracite Industries, Inc. Amplify the power of your selling efforts by tying it to broad promotion programs of Anthracite Industries, Inc.

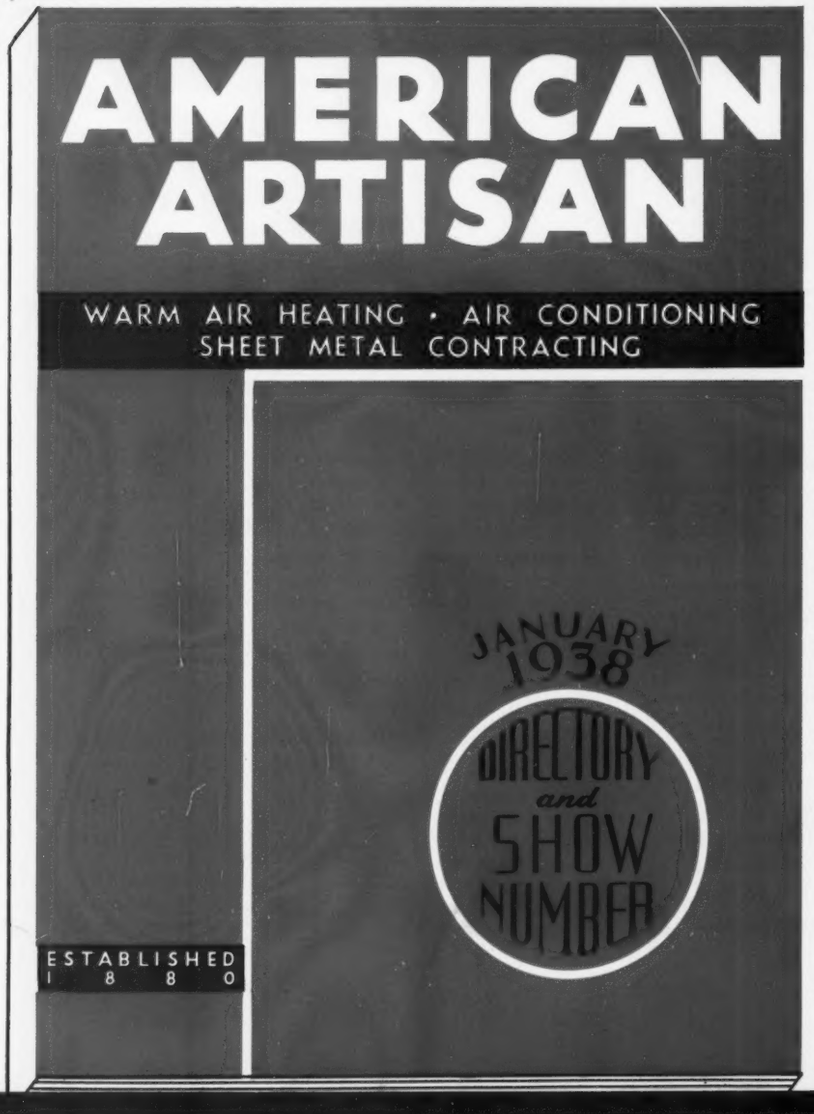
Coming

THE 6th ANNUAL DIRECTORY NUMBER COMBINED THIS YEAR WITH A COMPLETE PREVIEW OF THE AIR CONDITIONING SHOW

THE JANUARY 1938 ISSUE

OF

AMERICAN ARTISAN



Again CENTURY smashes all . . SALES RECORDS

Every year more and more dealers are taking advantage of the sensational opportunity the money-making Century franchise offers. By switching to Century, they are able to cover the entire heating field . . . thanks to the complete line of Century burners, boiler-burner units, hot water heaters, and Zeph-O-Lator, the striking new Century Warm Air Conditioning Furnace Unit.

But this constantly increasing dealer preference accounts for only part of the tremendous Century sales growth each year. Dealers themselves are doubling and tripling their own sales!

As a result of these two factors, Century sales again have broken all previous records.

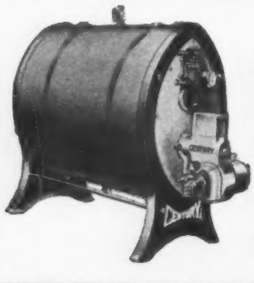
Before you start the new year, investigate Century. Check each Century Model feature by feature against all other makes. Study their unequalled engineering superiority . . . superiority that gives maximum overall heating efficiency . . . more comfort . . . more convenience . . . and greater all around economy. THE CENTURY ENGINEERING CORP., Dept. C, Cedar Rapids, Iowa.

CENTURY ZEPH-O-LATOR

Proves 85% Heating Efficiency

The amazing performance of this strikingly designed, unusually compact warm air conditioning furnace unit makes it one of the fastest selling in America today . . . along with the Century Model J . . . one of the fastest selling conversion burners.

CENTURY BOILER-BURNER UNIT



Exclusive features give larger heating surface, eliminate "Cold 70," provide maximum comfort and convenience at minimum fuel cost. Attractively designed, the Century Boiler-Burner Unit wins instant acceptance from prospects for new heating systems, or replacement of old boilers.

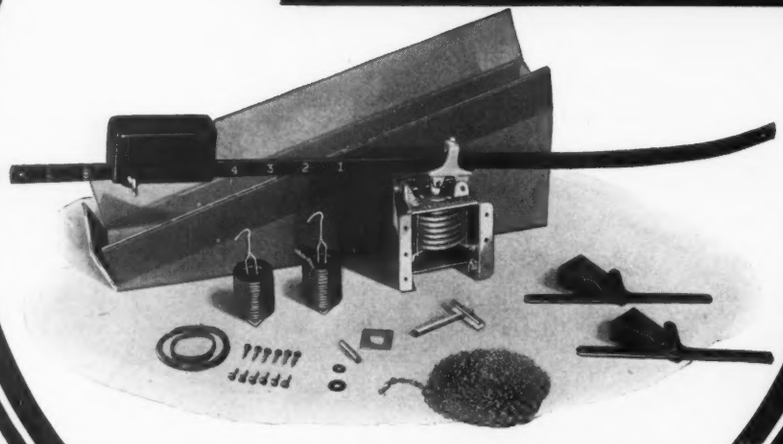
SWITCH TO *Century*

There are still a few choice franchises available if you hurry. Write today for complete details about Century burners and heating units, the tried and proved Century selling plan, liberal discounts, and special dealer franchise.

CENTURY

Conversion Burners . . Boiler-Burner Units . . Warm Air Furnace Units with Air Conditioning . . Hot Water Heaters

THE METAPHRAM REGULATOR



FURNACE TEMPERATURE CONTROL AT *Low Cost*

THE Metaphram furnace regulator will fill your demand for a low price control. Actuated by the return air temperature, the Metaphram Regulator safeguards the furnace against excessive temperatures and prevents under-shooting. It eliminates much attention on the part of the owner and results in a considerably more even temperature throughout the building than when manual control is employed. When price is the main objective, recommend Metaphram Furnace Regulators. They are simple, fool-proof, and durable. Minneapolis-Honeywell Regulator Co., 2726 Fourth Ave. So., Minneapolis, Minn. Branch and distributing offices in all principal cities.

MANUFACTURED BY

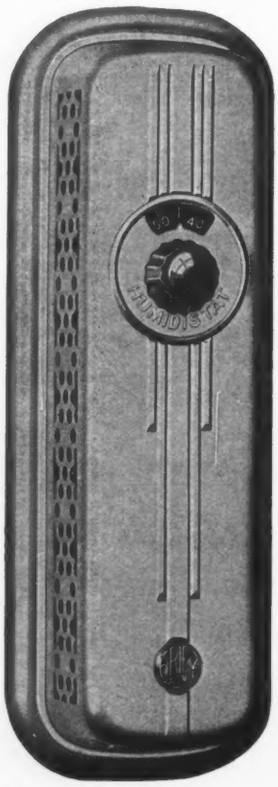
AUTOMATIC CONTROLS MH

NATIONAL REGULATOR DIVISION

MINNEAPOLIS-HONEYWELL

BROWN INDUSTRIAL INSTRUMENTS
NATIONAL PNEUMATIC CONTROLS

Control Systems



FRIEZ HUMIDISTAT

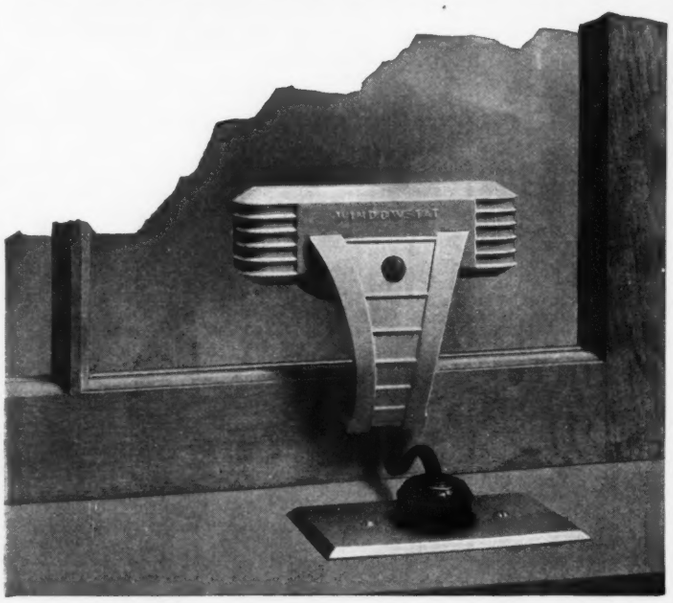
—A World Leader

Solved the Control of Humidity in WINTER AIR-CONDITIONING

- Sensitive
- Reliable
- Accurate

Bulletin AA describes details

Gone is WINDOW-CONDENSATION



FRIEZ WINDOWSTAT

Perfects Humidity Control

Stops, absolutely prevents moisture on windows.

New 1938 Model is unusually elegant in appearance and fits into any Winter Air-Conditioning system. The Friez Windowstat measures 5½ inches wides by 4½ inches high (including bracket).

Install it now as a simple, indoor control.

Bulletin WA describes details.

JULIEN P. FRIEZ & SONS

INCORPORATED

BALTIMORE — MARYLAND

A Big Market

With TRANE CLIMATE CHANGER

The Climate Changer supplies conditioned air the year 'round.

Interior view of Climate Changer.

Easy to Install

Duct arrangement to carry conditioned air to the rooms and return air for reconditioning.

Notice how little space basement installations require, and neat appearance.

AN exceedingly large market is open to the aggressive shop that will cash in on the active desire which people now have to enjoy the comfort of Air Conditioned rooms.

In the Climate Changer The Trane Company offers a unit that has won wide acceptance for service rendered and a piece of equipment for the Trade that has every advantage of easy and profitable installation. + It may be used as a year 'round conditioner; or installed for heating only, with cooling coils added later. This flexibility makes it fit into practically any heating budget. + The Climate Changer is ideal for installation in individual apartments. + Decide to push this line in your business. Trane has some good bulletin information for you and a branch office organization in 70 cities that can render valuable assistance.

SEND TRANE-O-GRAM TODAY

THE TRANE COMPANY
2007 CAMERON AVENUE
LA CROSSE, WISCONSIN

Send us your bulletin No. **230** for more details on this business.

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THE TRANE COMPANY
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TRANE
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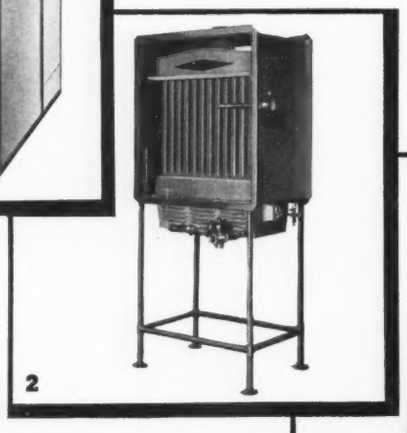
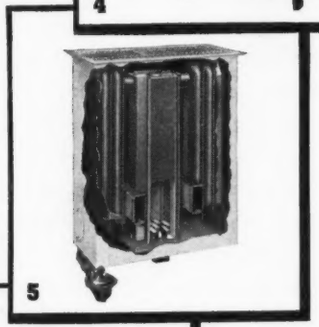
70 U. S. OFFICES

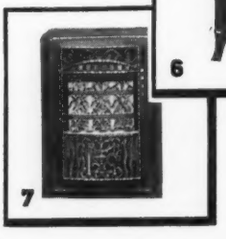
From LARGEST to SMALLEST

Pacific Makes the Most Complete Line of Gas Heating Appliances

For every industrial, commercial and residential heating requirement . . . for every climate from sub-arctic to sub-tropical . . . for natural or butane gas, there's a Pacific gas heating appliance that will give greater satisfaction and show a lower operating cost. Pacific pioneering is responsible for many outstanding developments in gas heating practice, including the Safety Pilot and the Multi-Tubular Burner. You can always depend on Pacific for dependable service. Write for catalog AA11.







1 PACIFIC STREAMLINE DE LUXE
Completely automatic forced-air heating and ventilating. Streamline casing furnished in attractive crackle finish with chromium trim. All controls completely enclosed.

2 PACIFIC DUCT UNIT
Designed for duct work on commercial, industrial and residential installations. Capacities from 55,000 to 300,000 BTU. Can be coordinated with summer cooling equipment to give year 'round air conditioning.

3 PACIFIC FORCED-AIR UNIT
Winter heating and summer ventilating in one compact, highly efficient unit. No basement required.

4 PACIFIC GRAVITY FURNACE
The basement type of warm air furnace is one of the most popular in the Pacific line. Thousands in successful use for many years.

5 PACIFIC FLOOR FURNACE
Circulates fresh warm air to every corner, giving even temperature so necessary for health and well-being. Eliminates damp, sweaty walls. Operates with extreme economy because of Pacific's famous Multi-Tubular Burner.

6 PACIFIC THERMOLATOR
One of the most efficient room heaters ever devised. Exclusive cast iron heating element "holds heat" longer. Vented and unvented types.

7 PACIFIC RADIANT HEATER
Pacific manufactures a wide variety of radiant heaters, both wall and portable types. Individual burner units permanently adjusted at the factory.

PACIFIC GAS RADIATOR COMPANY

1740 WEST WASHINGTON BLVD., LOS ANGELES, CALIFORNIA

Performance of Oil-Fired, Warm Air Furnaces in the Research Residence‡

By A. P. Kratz*
and S. Konzo**

Results of Tests Under Actual Service Conditions

IT is evident from the preceding discussion that the results obtained from oil-burning furnaces which are operated under actual service conditions should be dependent to a great extent upon the values which are maintained for the CO_2 content in the flue gas, for the oil input rate, and for the quantity of air circulated. In the case of the air quantity, in order to maintain comparable conditions with previous tests, the speed of the fan was adjusted so that approximately 1675 cfm delivery was obtained during the on-period of the fan. During the off-period of the fan a slight *gravity* action took place and a greatly decreased air quantity was circulated. With the exception of the series of tests for which the CO_2 content in the flue gas was maintained at 11.5 per cent, all of the tests were made with the CO_2 maintained at 9.5 per cent. For one series of tests the rate of oil input to the furnace was adjusted from a minimum value of 7.3-lb per hour to a maximum value of 13.0-lb per hour. However, for those tests which were made to study the comparative performance of the conversion unit and the oil-burning furnace the rate of oil input was adjusted to 13.0-lb per hour.

Variation in Rate of Oil Input

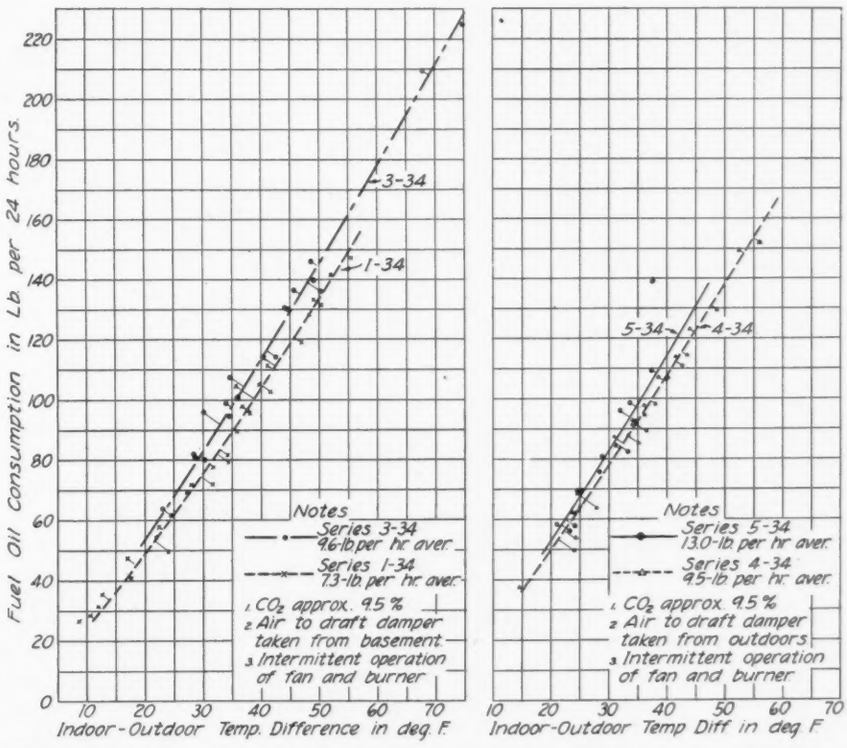
An extensive series of tests was conducted with a wide range of oil input rates that ranged from a minimum of 7.3-lb per hour to a maximum of 13.0-lb per hour. The heat supplied by the furnace when the burner was adjusted to maintain a 7.3-lb oil rate was not quite sufficient to offset the heat loss from the house during zero-degree weather, but was sufficient to supply the heat required during average weather conditions. The heat supplied by the furnace when the 13.0-lb rate was maintained was adequate to heat the house during the most severe weather conditions.

The weight of fuel oil required for a 24-hour period to maintain the temperature of the house at 71 F was

‡Paper presented at the 43rd Annual Meeting of the ASHVE, St. Louis, Mo., Jan., 1937, and published in Heating, Piping and Air Conditioning, Dec., 1936.

*Research Professor, Engineering Experiment Station, University of Illinois.

**Special Research Associate, Engineering Experiment Station, University of Illinois.



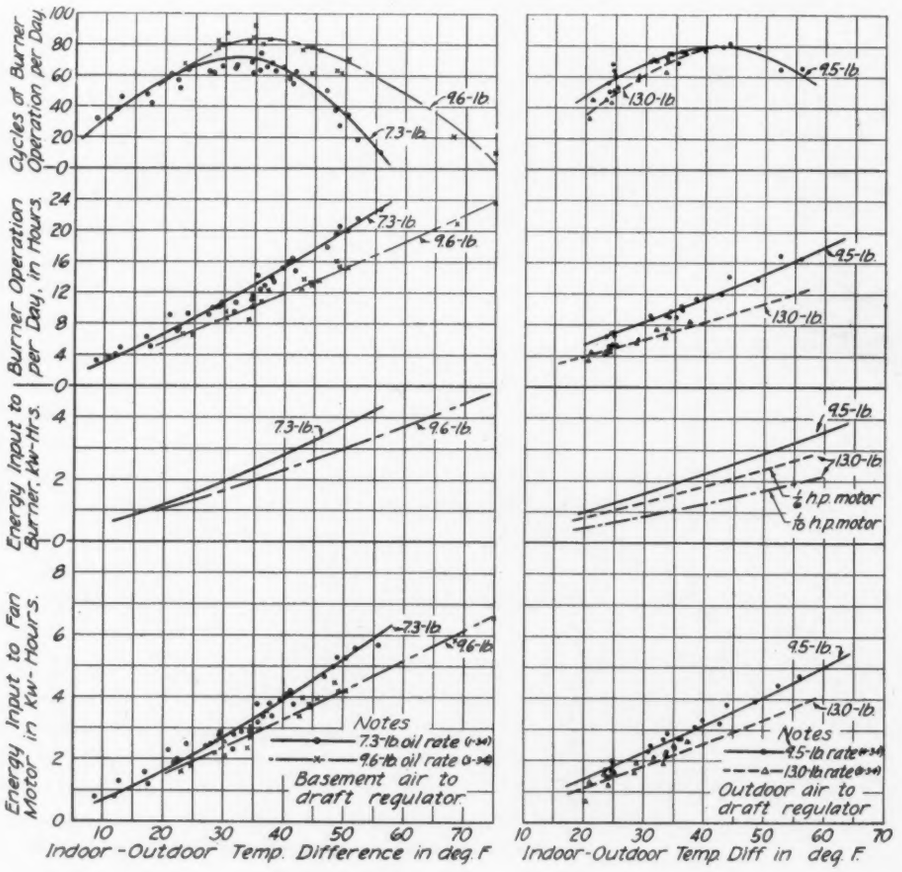
Figs. 10a (left) and 10b (right)—Daily fuel consumption curves for various rates of oil input into conversion oil furnace with forced-air heating system. Season 1934-35, Inst. 15

plotted against the difference in temperature between indoors and outdoors, as shown in Figs. 10a and 10b. The curves presented in Fig. 10a are for two rates of oil input, 7.3-lb and 9.6-lb per hour; while the curves presented in Fig. 10b are for rates of 9.5-lb and 13.0-lb per hour.

Although some of the points representing the daily test results deviate somewhat from the average curve drawn through the points, because of the influences of wind and sun which cannot be shown on a curve in which the abscissa is the temperature difference alone, the curves represent the general trend of the points with a reasonable degree of accuracy. The curves show that when a constant value of CO_2 in the flue gas was maintained, the fuel consumption increased as the rate of oil input was increased. For instance, it may be noted from Fig. 10b that the fuel requirements for a day in which the temperature difference between indoors and outdoors was 33 F were 88-lb and 94-lb for oil input rates of 9.5-lb per hour and 13.0-lb per hour, respectively. The increase in this case was of the order of 6 per cent. This indicates that the operation of the burner for relatively short periods, during which a high rate of combustion was maintained, was not as conducive towards fuel economy as the operation of the burner for longer periods during which a lower rate of combustion was maintained. In the former case the flue losses during the periods of burner operation, and also the losses due to the heat carried up the chimney during the off-periods of the burner, were greater than in the latter case on account of the higher temperatures of the flue gas. These statements would have to be modified, however, if there are any cases in which conditions might arise whereby the combustion process can be maintained better with high rates of oil input than with low rates.

The changes in the rate of oil input to the furnace were also reflected in the operation of the fan and burner units in the forced-air heating system, as shown by the data in Figs. 11a and 11b. The top set of curves in Figs. 11a and 11b shows, for the same series of tests whose results were shown in Figs. 10a and 10b, the frequency of burner operation as represented by the number of cycles per 24 hours. For a given rate of oil input it may be noted that in mild weather the frequency of operation of the burner increased as the temperature difference between indoors and outdoors increased. For larger values of temperature differences the burner continued in operation for longer periods and the frequency of the operating periods decreased. Finally, when the outdoor weather conditions were such that the heat developed in the furnace was just sufficient to offset the heat loss from the house, the burner operated continuously and the number of cycles per 24 hours became unity.

It may be noted from the second set of curves in Figs. 11a and 11b that the increase in the total time of operation of the burner was practically proportional to the increase in temperature difference between indoors and outdoors. Also, for a given outdoor temperature condition an increase in the rate of oil input was accompanied by a decrease in the total time of burner operation. Furthermore, the decrease in the total time of burner operation was in turn accompanied by a decrease in the electrical energy input to the burner motor, as shown by the third set of curves. It may be



Figs. 11a (left) and 11b (right)—Performance data for burner and fan operation in Research Residence. Conversion oil furnace with forced-air heating system. Season 1934-35. Inst. 15

observed from Fig. 11b that the substitution of a more efficient motor on the burner unit resulted in more economical use of electric current. It is also apparent that the electrical input to the burner motor, which included the energy required for the spark ignition process, was sufficiently large to be considered as an important item in determining the overall cost of operation of the heating plant.

With the method of thermostatic control used in these tests, the times at which the fan operated practically coincided with the times at which the burner operated, or the frequency of operation was nearly the same for both fan and burner. The total time of fan operation was in most cases slightly greater than the total time of burner operation, but the differences were so

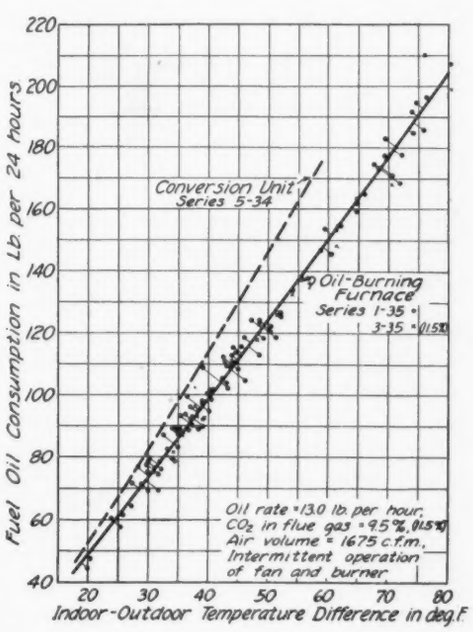


Fig. 12—Fuel consumption curves for two oil furnaces

small that for all practical purposes the data presented in the second set of curves in Figs. 11a and 11b apply equally well to the fan and the burner. The electrical input to the fan motor as shown by the bottom set of curves in Figs. 11a and 11b was smaller for the higher rates of oil input.

A comparison of total operating costs for an *average* heating day are of interest. For Urbana, Illinois, the average outdoor temperature during the heating season is 38 F. Hence for an indoor temperature of 71 F, the value of the average temperature difference between indoors and outdoors is 33 F. The comparisons based on this temperature difference may be regarded as indicative of the results to be secured from the entire heating season. For a day in which the indoor-outdoor temperature difference was 33 F the combined electrical energy inputs to the fan motor and burner motor were 4.4 kwhr and 3.6 kwhr for oil input rates of 9.5-lb and 13.0-lb per hour respectively. That is, the incease in fuel oil consumption amounting to 6 lb of oil per 24 hours which accompanied the use of the higher rate of oil input to the furnace, was partly offset by a decrease in consumption of electrical energy amounting to 0.8 kwhr. Based on unit costs of 7 cents per gallon for fuel oil and of 3.1 cents per kwhr for electrical energy, the increase in fuel cost amounting to 5.7 cents per day and the decrease in electrical cost amounting to 2.5 cents per day resulted in a net increase in cost of 3.2 cents per day. For conditions under which the unit electrical cost is much higher than 3.1 cents per kwhr, the net increase in cost might become negligible.

It is apparent from this study that seasonal operating costs of an oil-fired, forced-air heating system based only on the cost of fuel may be misleading, and that the total cost of operation which includes electrical costs should be considered. In most installations the minimum capacity limitations of the burner and the desirability of maintaining ample reserve capacity for sudden load demands make it necessary to provide an oil input rate that is somewhat in excess of the maximum heating demands. However, it may be concluded from these tests that from the standpoint of total operating cost the most economical operation would be obtained with the use of the minimum rate of oil input that is feasible for the installation.

Comparison of Conversion and Oil-Burning Units

The tests which were made to determine the comparative performance characteristics of the conversion unit and the oil-burning furnace under actual service conditions were conducted under identical conditions of operation. The results obtained for an oil input rate of 13.0-lb per hour with the conversion unit were presented in Figs. 10b and 11b and have been transferred to Figs. 12 and 13 for purposes of comparison with the results obtained with the oil-burning furnace. The curves representing the results for the latter furnace are shown as full lines.

It may be noted from the fuel consumption curves shown in Fig. 12 that the fuel requirements, for a day in which the indoor-outdoor temperature difference was 33 F, were 94-lb for the conversion unit and 82.5-lb for the oil-burning furnace. Thus the fuel requirements for an average day were approximately 14 per cent greater for the conversion unit than they were for the oil-burning furnace. For an indoor-outdoor temperature difference of 55 F the difference was greater, and amounted to approximately 19 per cent.

Slight differences in operating characteristics were also obtained, as are shown by the curves in Fig. 13, for burner cycles, burner operation, burner motor input, and fan motor input. Very little difference may be observed in the number of cycles of burner operation per day for the two installations. However, both the number of hours of burner operation and the electrical energy input to the burner motor were greater for the conversion unit than for the oil-burning furnace. This could be accounted for by the fact that although the rate of oil input was the same in the two installations, the total fuel consumption was greater for the conversion unit than for the oil-burning furnace and hence the hours of burner operation were also greater.

It may be observed that although the total time of fan operation per day was approximately 12 per cent less for the oil-burning furnace than for the conversion

(*Continued on page* 65)

SHORT FORM HEAT LOSS SURVEY

Dealer: Date 4-21-36

Made by E.A.B.

Name John Jones Address 1 Bond Place

No. Stories 2 Sun Porch (yes or no) Yes

Wall Construction Frame with studs - no insulation

Roof and Ceiling Construction No attic floor - no insulation

Window Construction Single windows - double hung - no w.s.

Heated Volume 13024 Cu. Ft. (Include all space heated directly or indirectly to design indoor temperature. Include half of basement volume, if heated to design temperature. Otherwise, neglect basement.)

This space for calculating volume, if necessary:

Main house	26 × 26 × 16½ =	11,154
Rear "L"	5 × 14 × 8½ =	595
Sun Porch	10 × 15 × 8½ =	1,275
		13,024

Basement not included. It is heated by losses from boiler and piping to approx. 60°.

Calculation of Factor:

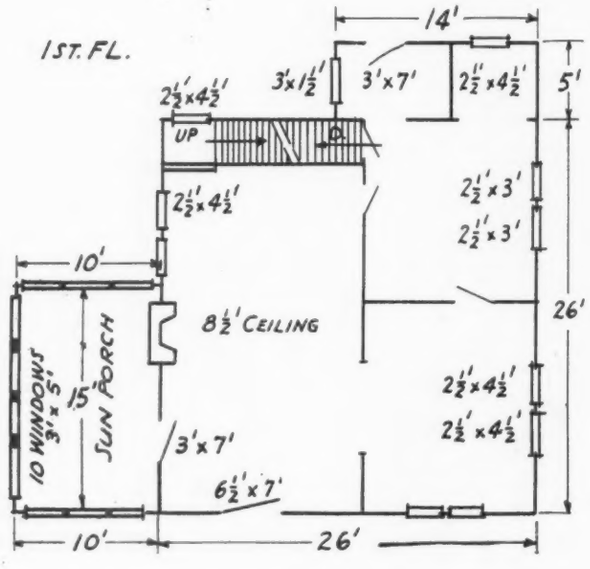
	Heat Loss Coefficient		Coefficient Multiplier		Factor
Wall:	.26	X	.1	=	.026
Roof:	.24	X	.083	=	.02
Window:	1.65	X	.027	=	.045
			Total Factor	=	.091
Add 5% if house has sun porch (or porches)				=	.005
Add 5% exposure factor for wind above 15 mph				=	.005
			Overall Factor	=	.101

Heat loss (BTU/hr./deg.) 1440 X (Degrees) 70 = 100,800 BTU/hr.

Remarks:

Fig. 1—Form (8½x11) filled in for house in Fig. 2.

THE purpose of this supplement is to describe the practical use of the short form method in greater detail. Questions from several readers indicate that the use of the form was not explained fully enough in the previous article. Also, unfortunately, two errors were made when the form was inked in on page 115 of the January issue. This lead to some misunderstanding in the use of the method.



A Time Saving Method For Figuring Heat Loss

A supplement to the article of the same title which appeared in the January, 1937, issue.

By E. A. Bailey
General Electric Co.

The form is reprinted in Fig. 1 and is now correctly filled out for the example in the previous issue. Note that the volume for the rear "L" is 595 cu ft which makes the total heated volume 13,024 cu ft. This heated volume and the overall factor .101 are used on the curves for 1½ story and larger homes reprinted in Fig. 3. The inked in lines in this figure show how to locate the heated volume at the bottom of the chart, read vertically upward to the .101 factor line (approximately .100) and then read horizontally across from this point to the heat loss in B.T.U./hr./deg. This heat loss 1,440 is entered in the bottom of the form and multiplied by 70 (the temperature difference) to obtain the total heat loss for the house 100,800 B.T.U./hr.

It should now be noted that the heat loss obtained by the short form method is only about 1% less than that obtained by the detail calculations shown in the January issue. This accuracy is usually possible with houses of usual typical shape and average window area. Seldom will the error be more than 10%, even with unusual houses.

Fig. 2—First and second floor plans of house used as example to show procedure in applying this suggested calculating sheet.

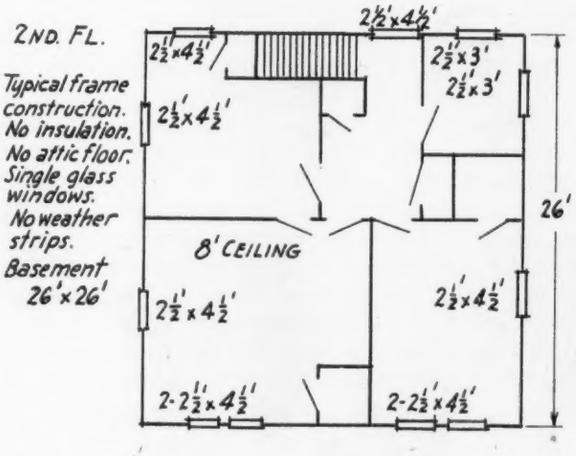


TABLE 1

Type of Home	Coefficient Multiplier		
	Wall	Roof	Window
1 story	.110	.150	.027
1½ story	.100	.100	.027
2 story	.100	.083	.027
2½ story	.100	.065	.025
3 story	.085	.062	.023
4–5 story	.070	.040	.020

TABLE 2

WALL COEFFICIENTS:

Frame walls: Exterior; clapboards, shingles, or brick veneer and sheathing. 2 in. by 4 in. studding. Interior; lath and plaster, or plaster board and plaster.

No insulation	.26
½-in. flexible insulation or 1 in. rigid insulation	.16
Cellular Gypsum fill	.11
Flaked Gypsum fill	.10
Rock wool fill	.07

	8 in. Thick	12 in. Thick
Plain Brick Walls, no interior finish.	.50	.36
With ½ in. plaster on brick	.46	.34
With ½ in. plaster on wood lath	.30	.24
Brick Veneer on hollow tile walls:		
No interior finish	—	.34
With ½ in. plaster on tile	—	.33
With ½ in. plaster on wood lath	—	.24
Stone Walls—no exterior finish:		
Plain walls, no interior finish	.71	.58
With ½ in. plaster on stone	.64	.53
With ½ in. plaster on wood lath	.37	.33
Hollow Concrete Blocks—no ext. finish:		
Plain walls, no interior finish	.56	.49
With ½ in. plaster on walls	.52	.46
With ½ in. plaster on wood lath	.32	.30

TABLE 4

WINDOW AND INFILTRATION COEFFICIENTS

Single windows, no weatherstrips	1.65
Single windows, weatherstrips	1.45
Storm windows, no weatherstrips	.85
Storm windows, weatherstrips	.60
Steel sash casement windows	1.65

PURPOSE OF METHOD: The short form method is intended primarily for the use of sales engineers in making up quoting prices on equipment. It should not be used for the design of a heating system after the order is obtained.

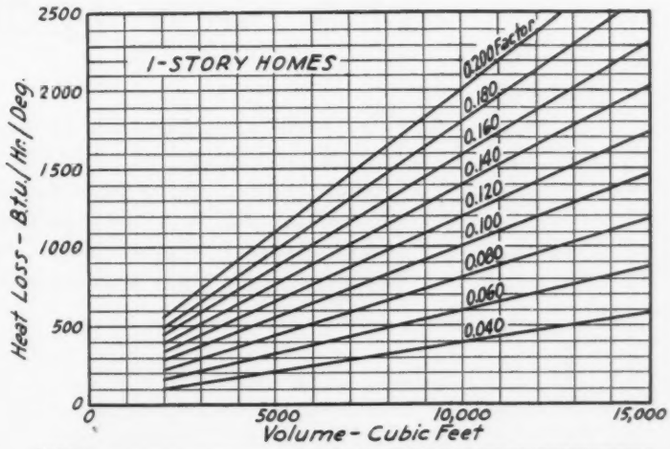
ACCURACY: Usually within 10% of the result given by a detail calculation if the window does not vary more than 15% from average.

BOILER LOAD WITH STEAM SYSTEM: Installed radiation determines boiler load.

COMMON WALLS: Not more than 5% of total floor area is over space which is not heated to at least 50 degrees by losses from heating plant or otherwise, the heat loss from such floor area must be estimated and added to the result obtained by the short form.

COMMON WALLS: Not more than 5% of wall area can be common to another building.

UNEXCAVATED FLOORS: If more than 30% of total floor area is over space which is not heated to at least 50 degrees by losses from heating plant or otherwise, the heat loss from such floor area must be estimated and added to the result obtained by the short form.



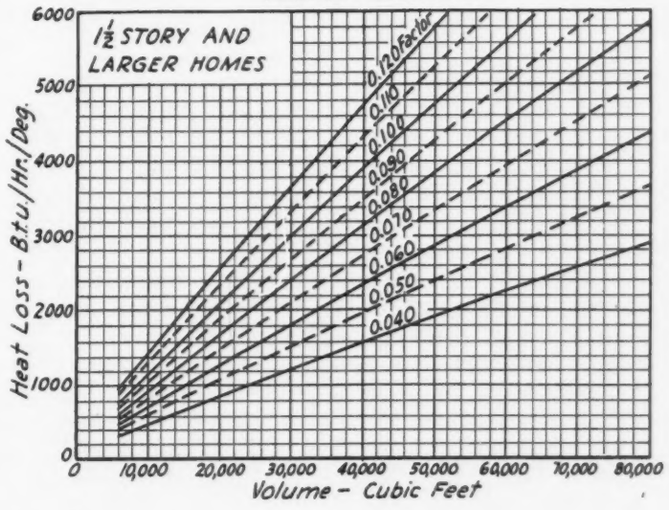


TABLE 3 — **Roof Coefficients**

Exterior: Shingles, Tile or Slate on Wood Sheathing. Ceiling (below attic floor) plaster on lath or plaster board

Interior covering of rafters ☛	NO ATTIC FLOOR			1-IN. ATTIC FLOOR		
	None	Lath and Plaster	½-in. Insulation	None	Lath and Plaster	½-in. Insulation
No insulation between floor joists	.24	.19	.16	.16	.14	.12
½-in. flexible insulation between floor joists	.14	.13	.11	.11	.10	.093
2-in. loose insulation between floor joists	.11	.095	.087	.089	.081	.075

The only use of the curves is to make a slight correction for the fact that the external areas of a small house are greater in proportion to the volume than they are for a large house. The coefficient multipliers are based on 1 story houses of about 10,000 cu ft and other houses of about 30,000 cu ft. This is evident from the curves because at those volumes, approximately, the heat loss in B.T.U./hr./deg. could just as well be determined by multiplying the volume by the overall factor.

Considering the above, it is evident that results of fairly close accuracy can be obtained by multiplying the heated volume by the overall factor. Furthermore the estimator will gradually establish factors from experience. For example note the following for several types of 2-story construction:

	Overall Factor (Approx.)
Frame, single windows, no weather strip, no insulation	.095
Frame, storm windows, no weather strip, no insulation	.075

(*Continued on page* 66)

The New Technical Code

This article concludes our series in which a typical house is heated by a forced air system designed according to the new technical code. If any point has not been sufficiently explained, we shall be glad to answer questions. We are indebted to the teaching staff of the Michigan State College Short Course for the plans, data sheet and explanation of procedure.

IN the discussion of the code in the October issue we completed items 29 to 42, thereby establishing our actual register air temperature for each outlet; established the resistance of the piping system; found that each room on the second floor can be heated by one stack; determined the actual, corrected branch pipe size; established our register velocity and register size.

This, as we said in concluding October, brings us to the return air side of our system. In general, the procedure followed is identical with the procedure for the warm side (items 29 to 42).

However, we are not going to have a return from every room in our house. Therefore, we will not have as many return openings as we have warm air supply openings—but we have to bring back as much air as we supply, or approximately so.

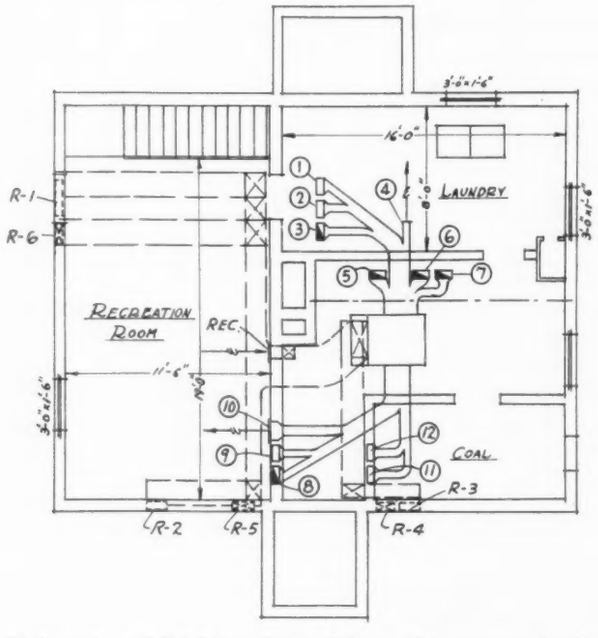
The first problem, then, is to select those rooms from which air is to be returned and locate the return air faces. In item 43 it is presumed this has been done and that returns are to be seven in number. These are numbered R-1, R-2, R-3, R-4, R-5, R-6, and recreation room as shown in item 43.

In item 44 the room in which the return is located and *any other room served by any one return* is designated underneath the return number. This is important, particularly where all rooms do not have a return because the air volume of rooms without returns must be included with rooms with returns in order to handle our prescribed volume of air to the blower.

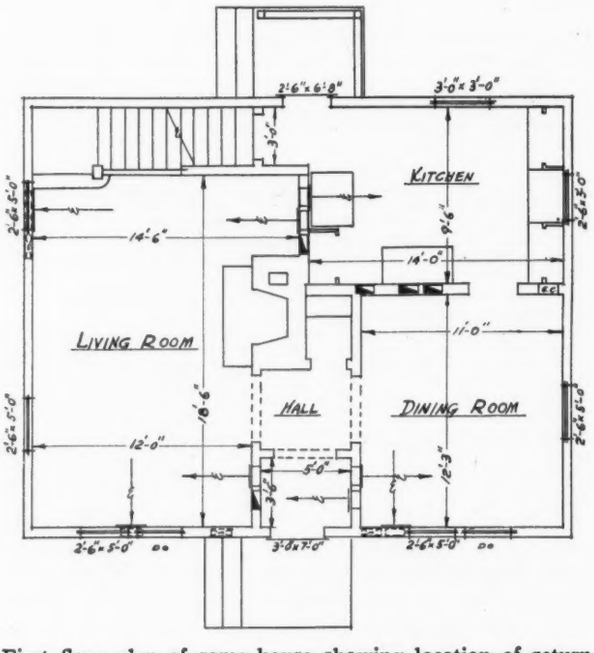
So in item 44 we enter the rooms served by each return. R-1 is a problem because this one return is called upon to handle the air from one end of the living room, plus the air from the upstairs hall, plus the air volume of the bath room which has no return. Return R-3 handles the volume from one half the living room plus the volume of the hall and the kitchen. All other returns handle only the volume of the room in which the return is located.

The suggested procedure here is to decide which rooms are to be served by each of the returns and then skip from item 44 for a moment to fill in item 45. With item 45 filled in, we skip back to item 44 and use item 44 in filling in item 46.

For item 45 we must proceed as we did in item 33 on the warm side and establish the equivalent length of each pipe from blower to return air face.



Piping plan of Michigan State College short course in air conditioning showing two warm air main trunks and return with registers and stacks numbered for the data sheet.



First floor plan of same house showing location of return air grilles. There are no returns from the second floor.

DESIGN C.F.M. 1243 DESIGN REG. TEMP. 141 DESIGN STATIC .06

WARM AIR LAYOUT

29	STACK NUMBER	1	2	3	4	5	6	7	8	9	10	11	12			
30	ROOM USE	KITCHEN	½ LIVING	BED #1	LAUNDRY	HALL UP	BATH	BED #3	BED #2	½ LIVING	REC	HALL	DINING			
31	B.T.U.	8970	6240	4780	9990	6720	4960	7750	7570	6240	14370	3770	8890			
32	ACTUAL LENGTH	12	11	20	5	18	18	18	23	11	9	10	9			
33	EQUIVALENT LENGTH	37	36	65	10	58	58	63	48	36	24	35	24			
34	REGISTER TEMPERATURE - CORRECTED	142	142	140	144	141	141	141	139	142	143	143	143			
35	FACTOR Q	.0136	.0136	.014	.0133	.0138	.0138	.0138	.0142	.0136	.0135	.0135	.0135			
36	C.F.M. - CORRECTED	122	85	67	133	93	69	107	108	85	193	51	120			
37	ROUND PIPE SIZE - BEFORE CORRECTION	7.4	6.4	5.9	7.6	6.7	5.9	7.0	7.0	6.4	8.7	5.3	7.3			
38	CORRECTION FACTOR - TABLE 9	.835	.835	.93	.63	.905	.905	.93	.87	.835	.785	.835	.785			
39	ROUND PIPE SIZE - CORRECTED	6.2	5.4	5.5	4.8	6.1	5.4	6.5	6.1	5.4	6.9	4.5	5.8			
40	RISER SIZE	10x3½	10x3½	10x3½		10x3½	10x3½	12x3½	10x3½	10x3½		10x3½	10x3½			
41	REGISTER VELOCITY	300	300	300		300	300	300	300	300	500	300	300			
42	REGISTER SIZE	10x8	10x6	10x5		10x8	10x6	10x8	10x8	10x6	12x8	10x4	10x8			

RETURN AIR LAYOUT

43	STACK NUMBER	R-1	R-6	R-2	R-5	REC	R-4	R-3								
44	ROOM USE	HALL & LIV.	BED #1	LIVING	BED #2		BED #3	DIN. & KIT.								
45	EQUIVALENT LENGTH	60	70	50	60	40	50	40								
46	C.F.M. - CORECTED	247	67	189	108	193	107	180								
47	ROUND PIPE SIZE - BEFORE CORRECTION	9.5	5.9	8.6	7	8.7	7	8.5								
48	CORRECTION FACTOR - TABLE 9	.905	.93	.87	.905	.835	.87	.835								
49	ROUND PIPE SIZE - CORRECTED	8.6	5.5	7.5	6.4	7.3	6.1	7.1								
50	STACK SIZE	2-10x3½	10x3½	14x3½	12x3½	14x3½	10x3½	14x3½								
51	R.A. REGISTER OR GRILLE VELOCITY	24x4	10x4	14x5	12x4	14x6	10x5	14x5								
52	R.A. REGISTER OR GRILLE SIZE	500	500	500	500	500	500	500								

DUCT LAYOUT

	STACK NO.	BRANCH TRUNK C.F.M.	MAIN TRUNK C.F.M.	RD. PIPE BEFORE CORR.	CORR. FACTOR	RD. PIPE CORR.	RECT. EQUIV	STACK NO.	BRANCH TRUNK C.F.M.	MAIN TRUNK C.F.M.	RD. PIPE BEFORE CORR.	CORR. FACTOR	RD. PIPE CORR.	RECT. EQUIV.	STACK NO.	BRANCH TRUNK C.F.M.	MAIN TRUNK C.F.M.	RD. PIPE BEFORE CORR.	CORR. FACTOR	RD. PIPE CORR.	RECT. EQUIV.
53	1		122	7.4	.835	6.2	5 x 8	8		108	7.0	.87	6.1	4 x 8	R-1		247	9.5	.905	8.6	8 x 8
54	2		85	6.4	.835	5.4	4 x 8	9		85	6.4	.835	5.4	4 x 8	R-6		67	5.9	.93	5.5	4 x 8
55			207	8.9	.835	7.5	6 x 8			193	8.9	.87	7.8	7 x 8			314	10.5	.93	9.8	10 x 8
56	3		67	5.9	.93	5.5	4 x 8	10		193	8.7	.785	6.9	5 x 8	R-2	189		8.6	.87	7.5	6 x 8
57			274	9.9	.93	9.2	9 x 8			386	11.3	.87	9.9	11 x 8	R-5	108		7.0	.905	6.4	5 x 8
58	4		133	7.6	.63	4.8	4 x 8	11	51		5.3	.835	4.5	4 x 8			297	10.3	.905	9.4	10 x 8
59			407	11.5	.93	10.7	12 x 8	12	120		7.3	.785	5.8	4 x 8			611	13.4	.93	12.5	17 x 8
60	5		93	6.7	.905	6.1	4 x 8			171	8.4	.835	7.1	6 x 8	REC		193	8.7	.835	7.3	6 x 8
61			500	12.4	.93	11.6	15 x 8			557	12.9	.87	11.3	14 x 8			804	14.8	.93	13.8	21 x 8
62	7	107		7.0	.93	6.5	5 x 8								R-3	180		8.5	.835	7.1	6 x 8
63	6	69		5.9	.905	5.4	4 x 8								R-4	107		7.0	.87	6.1	4 x 8
64			176	8.5	.93	7.9	7 x 8										287	10.1	.87	8.8	8 x 8
65			676	13.9	.93	13.0	18 x 8										1091	16.5	.93	15.4	26 x 8

Remember we measure from center line to center line of each pipe and count 10 feet for each 90-degree, 5 feet for each 45-degree elbow and so on. (See item 33 in the October issue.)

Taking first R-1 from the living room and upstairs hall we find a first floor, baseboard register. We have 5 feet for the register box, 10 feet for the turn from box to run between joists, 10 feet for the 90-degree turn out of the joists across the basement, 10 feet for the 90-degree turn from pipe through partition into the furnace room. The total for elbows and turns is 35 feet. Scaled off from the plans the actual length is 11 plus 10 plus 4 feet equals 25 feet. Then 25 feet actual length, plus 35 feet for turns, equals 60 feet which is our equivalent length entered in item 45.

R-6 from the second floor shows the same 35 feet for turns and elbows (the 90-degree turn at the base of the stack was also counted for R-1 on the first floor) and our actual length is 8½ feet for the riser length, plus 2 feet for depth of first and second floor joists, plus 11 feet between joists, plus 8 feet across joists, plus 6 feet into furnace room, total actual length 35.5 feet. To this we add our 35 feet for turns and have 70½ feet which we call 70 feet and enter this in item 45.

For R-2, again from the living room, we have 5½ feet between joists, 7 feet across joists, 6 feet into furnace room, total 18½ feet actual length. We have 5 feet for the register box, plus 10 feet into the joist space, plus 10 feet for the 90-degree turn across joists, plus 10 feet for the 90-degree turn into the furnace room, total 35 feet for turns. Adding 35 feet and 18½ feet we have 52½ feet which we call 50 feet in item 45.

It might be explained here that parts of one foot or even one foot is not always counted because when we use the equivalent length to correct our pipe size in Table 6 we use the closest 5-foot interval. Also, we are using figures from the school plan which have been worked out completely, so contractors might carry out to the nearest foot these total equivalent-actual lengths until they become accustomed to the short cut corners.

The remainder of item 45 is filled in across in a similar manner.

When we come to item 46 where corrected cfm is filled in we backtrack to item 44, where previously we have combined our rooms so that the volume of all rooms is accounted for even though some rooms may not have any return.

On the first floor we have three returns available —two in the living room and one in the dining room. Into these three returns we must take the cfm being supplied to the living room, dining room, kitchen, first floor hall, second floor hall, and second floor bath room. From item 36 (cfm, corrected, warm air supply) we find that the corrected cfm for these rooms are as follows—living room 85 plus 85 equals 170; dining room, 120; kitchen, 122; first floor hall,

51; second floor hall, 93; second floor bath, 69. The total is 625 cfm.

This total cannot be divided evenly between the three returns because we are restricted in our dining room pipe. This dining room return pipe is between two joists and less than joist deep and into this space we have to take the air from R-4 from bed room number 3. The cfm for R-4 is 107 and the total volume one joist space can handle is approximately 300 cfm at .06 resistance. This will be clarified more completely when we size our pipes and correct for lengths.

If the space will handle 300 cfm and we are taking 107 cfm from bed room number 3 we have left about 180 cfm for the dining room. Then we subtract our 180 cfm which the dining room can handle from our total first floor cfm of 625 leaving 445 cfm to be handled by the two returns in the living room. It seems reasonable to assume that the return near the foot of the stairs will handle one half the living room plus the upstairs hall and bath or 85 plus 93 plus 69 or 247 cfm, so accordingly we assign to return R-1 247 cfm and place this in item 46 under R-1. We then subtract this 247 cfm from the remaining 445 cfm and have 198 cfm for the other return in the living room. On the data sheet, item 46 this is entered as 189 cfm through an error. Rather than change all the calculations remaining we leave this as 189 cfm since its use is the same in the calculations following.

Then the second floor returns are entered from item 36 as follows—R-6 for bed room No. 1, 67 cfm; R-5 for bed room No. 2, 108 cfm; recreation room, 193 cfm; R-4 for bed room No. 3, 107 cfm.

This completes item 46 and we are ready for item 47 (round pipe sizes before correction). We design the return system on the same resistance as we used for the warm air supply, namely .06 inch. We turn to Table 6 and under the column .06 resistance find our cfm's. R-1 calls for 247 cfm (item 46) and Table 6 shows this needs a round pipe 9.5 inches in diameter. (245 cfm is the closest cfm in Table 6) R-6 at 67 cfm calls for 5.9 inch pipe. R-2 at 189 cfm calls for a 8.6 inch round pipe and so on across item 47.

Again we must correct this pipe size by using Table 9 which gives a correction factor for our equivalent length of pipe. R-1 has an equivalent length of 60 feet (item 45) and the factor for 60 feet is .905. This is entered in item 48. R-6 has an equivalent length of 70 feet and the factor in Table 9 is .93. This is entered in item 48. The rest of the correction factors are entered in item 48 in a similar manner.

We correct our round pipe size in item 49 by multiplying the round pipe size in item 47 by the correction factor in item 48. Thus round pipe size in item 47 of 9.5 for R-1 multiplied by .905 is 8.597 or 8.6 in item 49. The rest of item 49 is filled in accordingly.

We fill in item 50 for stack size by using Table 7 which gives a selection of stack sizes for round pipe diameters. We elect to use all 3½-inch stacks and from Table 7 pick out the stack sizes nearest our corrected round pipe size in item 49. The only question may be R-1 which calls for a 8.6-inch round pipe and since no single 3½-inch stack will take care of this large a pipe we use two 10 by 3½-inch stacks. In item 51 our register face is filled in from catalogs for the velocity of 500 fpm which we have chosen in item 52.

(*Continued on page* 68)

Table No. 4

C.F.M. Capacities of Individual Round Pipes

*Asterisk indicates Commercial Sizes.

.06 cfm	.08 cfm	.10 cfm	.12 cfm	.15 cfm	Rd. Pipe Size
45	50	55	65	70	5.0*
47	53	60	67	73	5.1
50	57	65	70	80	5.2
53	60	67	75	85	5.3
55	62	70	77	90	5.4
57	65	75	80	95	5.5
60	70	80	85	97	5.6
64	75	82	90	100	5.7
65	77	85	95	105	5.8
70	80	90	100	110	5.9
73	88	95	108	120	6.0*
75	93	100	105	125	6.1
78	90	108	110	130	6.2
80	95	105	115	135	6.3
85	100	110	120	140	6.4
90	105	115	125	145	6.5
92	110	120	130	150	6.6
95	112	125	135	160	6.7
100	115	130	145	165	6.8
105	120	135	150	170	6.9
110	125	140	155	175	7.0*
113	130	150	160	185	7.1
115	135	155	170	190	7.2
120	140	160	175	200	7.3
125	145	165	180	205	7.4
130	150	170	185	215	7.5
135	155	175	190	220	7.6
140	160	180	195	230	7.7
145	165	190	205	235	7.8
150	170	195	210	245	7.9
155	180	205	220	255	8.0*
160	185	210	230	265	8.1
165	190	215	235	270	8.2
170	195	220	240	280	8.3
175	200	230	250	290	8.4
180	210	240	260	300	8.5
190	220	250	270	310	8.6
195	225	255	280	320	8.7
200	230	260	285	330	8.8
210	240	270	290	340	8.9
215	250	280	305	350	9.0*
220	255	285	310	360	9.1
225	260	295	320	370	9.2
230	265	300	330	380	9.3
240	275	310	340	390	9.4
245	280	320	350	400	9.5
250	290	330	360	415	9.6
260	300	340	370	430	9.7
270	310	350	380	440	9.8
275	320	360	390	450	9.9

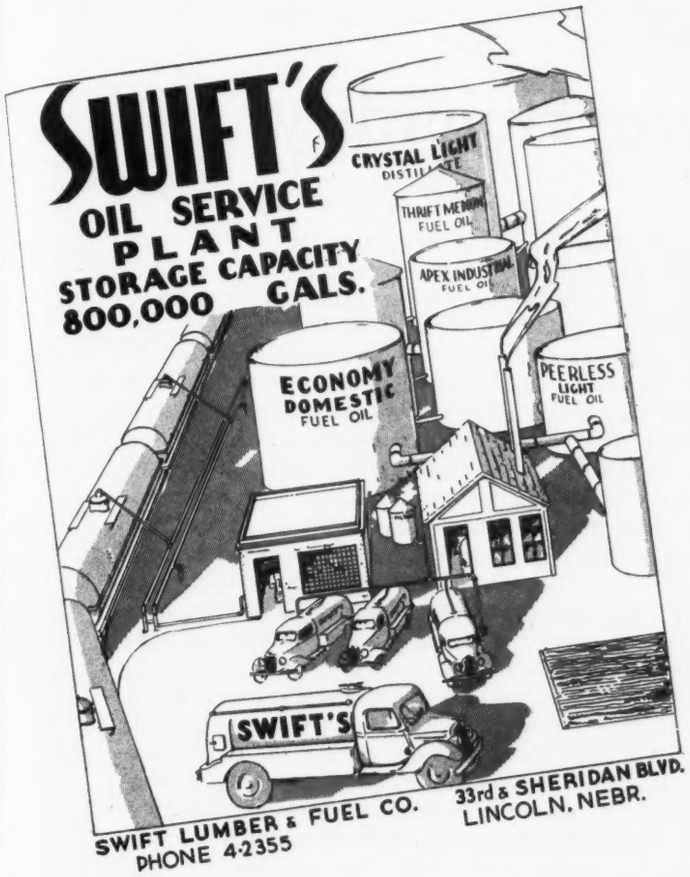
Abbreviated Table 6 from Code showing cfm capacities of round pipes at resistances from .06 to .15.

Table No. 9

Correction Tables for Pipes of Unequal Equivalent Lengths

Equivalent Length of Round Pipe in Feet	Correction Factor
200	1.150
190	1.140
180	1.125
170	1.115
160	1.090
150	1.075
140	1.065
130	1.050
120	1.035
110	1.020
100	1.000
90	.985
80	.965
70	.93
60	.905
50	.87
40	.835
30	.785
20	.725
10	.63

The above table is for the purpose of correcting the diameter of round pipes of unequal equivalent lengths, in order that any or all pipes, regardless of their equivalent lengths, will handle any required cfm at the same predetermined static pressure.



Oil Burners

A Case History of One Firm's 15 Years Experience

By S. S. Swift

Swift Lumber and Fuel Co., Lincoln, Nebraska

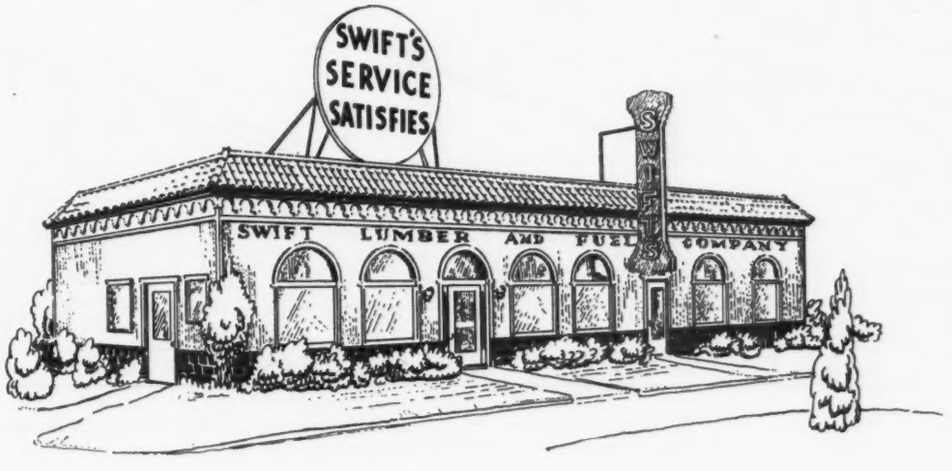
ONCE upon a time a long time ago—I believe this is the approved method used in telling fairy tales. This is not a fairy tale, but the way oil burning started domestically is almost like one.

Anyway in the years 1921 and 1922, we were in the lumber and coal business in this same market and trying, just as we are today, to increase our volume and assure a reasonable profit for our efforts. One of our troubles in those days was the ever increasing loss of customers to oil burning. In as much as we were not selling oil, we honestly felt that the customer was wrong and we were right in our contention that oil burning was just a fad and would soon be replaced by the same, good, reliable coal.

Finally, however, after considerable investigation we decided to follow the lines of least resistance and sell our good customers oil if they wanted it, rather than to lose their business to competitive oil companies. This decision necessitated the purchase of an oil storage tank, a truck tank, some pumping equipment and piping. It is perhaps needless to say that our first investment was small. Our first storage tank held 25,000 gallons, and our first tank truck had a capacity of 400 gallons. Our pumping equipment on our delivery truck was a hand-operated piston pump on the running board.

Domestic oil at that time was distillate, and we were rather surprised at the volume of business we did the first year. Oil burners, or what were laughingly called oil burners, were going in quite rapidly. These burners were being sold by almost every plumber and furnace man. The tanks were usually installed on top of the ground back of the house, in the garage, under the porch, or almost any place that the imaginations of the seller or the buyer could conceive to put them. These tanks ranged

(*Continued on page* 86)



Some Fallacies of 40% Relative Humidity

WITH winter approaching and winter air conditioning likely to be a very much talked of development, humidity will again take the stage with hundreds of thousands of words written and spoken about it. Home owners will be told the physical advantages of adequate humidity. Medical data will be produced to show how reduction of colds and better general health are possible when sufficient humidity is provided.

Once again 40 per cent relative humidity will be the hero of the drama.

As the industry which has pioneered winter air conditioning we—the warm air heating fraternity—logically should take the lead in pointing out some of the fallacies of this loose humidity conversation.

Most important of all, we should take the lead in emphasizing that this popular 40 per cent relative humidity is all very well in theory, but quite a problem in application.

Forty per cent relative humidity may have a sound basis in health, but how many home owners can have it? Let's go back for a moment and see just what data is available.

First of all we will take a look at Fig. 1. This chart was prepared by O. J. Kuenhold for his series on humidification published in the January, February, March, 1936 issues of AMERICAN ARTISAN. This chart tells the story of *what we can do*. Let this be repeated—*what we can do*—not what we hope to do.

Across the bottom of the chart are plotted outdoor temperatures. In the range of outdoor temperatures from zero to 20 degrees above, is the zone when most emphasis is placed upon the need for humidification. On the chart, line N shows average relative humidities of outdoor air when brought into the house and heated to 70 degrees. Note that this outdoor air heated to 70 degrees will have a percentage of relative humidity of 5 per cent at zero and 12 per cent at 20 degrees above. Obviously to get the percentage of relative humidity which is conducive to comfort and health additional moisture must be added.

This problem can be considered in terms of grains of moisture per pound of air. If the outdoor temperature is 20 degrees above zero the outdoor air coming into the house carries about 13 grains of moisture per pound of air. To maintain 40 per cent relative humidity at 70 degrees the air must contain 49.5 grains of moisture per pound of air. So we have to add 49.5 — 13 equals 36.5 grains of moisture.

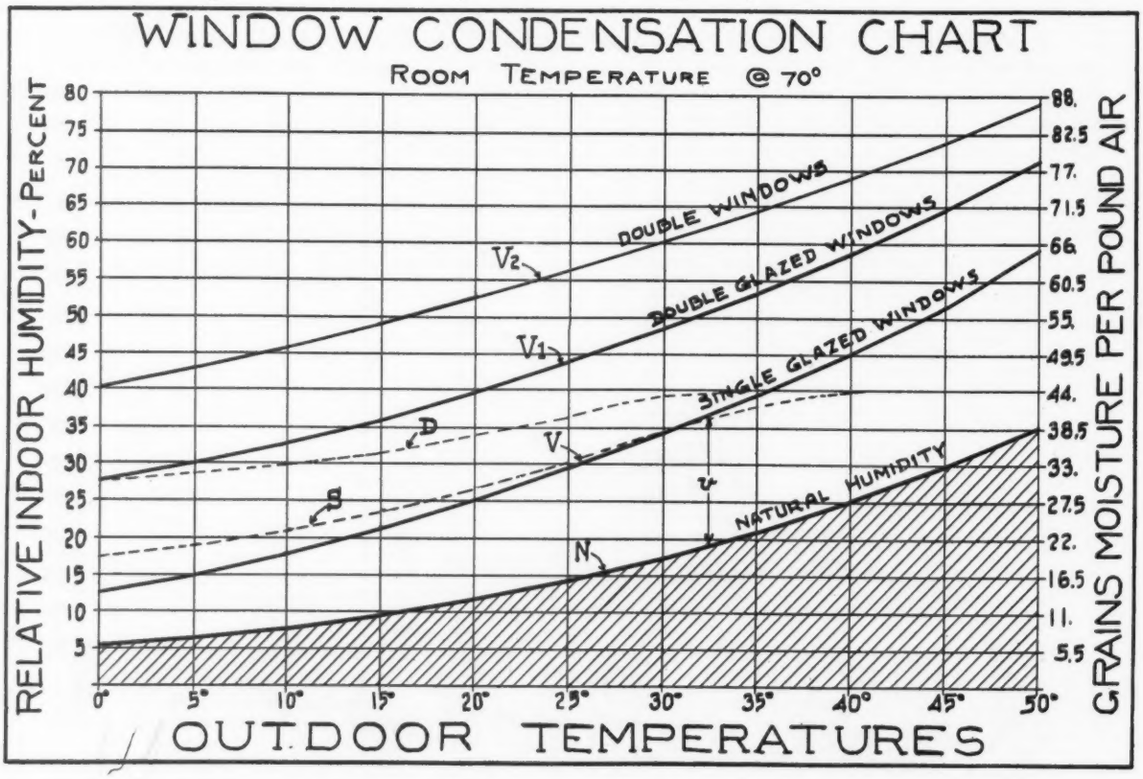


Fig. 1—Chart prepared by O. J. Kuenhold for articles on humidification. Lines show percentages of relative humidity at which condensation occurs.

Granting that health calls for 40 per cent relative humidity in 70 degree temperatures—can this humidity be carried in the average house and does the owner want this amount of moisture?

Condensation Points

The chart in Fig. 1 shows with curves V, V1, V2 at what percentages of relative humidity condensation appears on windows with an indoor temperature of 70 degrees. For example at 20 degrees above zero condensation appears on single glass windows at 25 per cent RH. If the windows are double glazed, in one sash, condensation appears at 40 per cent RH. If tightly fitted storm sash are used and all cracks sealed condensation appears at 53 per cent relative humidity.

The point to this is—the owner cannot carry 40 per cent RH on a 20-degree above zero day until his windows are double glazed or have sealed storm sash unless he is willing to have the glass covered with a film of moisture.

At 10 degrees above zero—just the kind of a day that the owner most wants humidity—condensation appears on single glass at 18 per cent RH; on double glazed windows at 35 per cent RH; and with sealed storm sash at 46 per cent RH.

Must Have Storm Sash

Now if our home owner is willing to put storm sash —tightly sealed—*at all windows*—we can assure him that he can have the percentage of relative humidity which he conceives to be desirable. If his wife objects to moisture on the glass, or if she wants storm sash left off of some windows for ventilation, we had better be careful of complaints unless we explain these facts clearly beforehand.

Here is another problem which has not received justifiable attention. If indoor air is held at 40 per cent RH all clothing will be saturated to the extent of 40 per cent RH. When the wearer steps out of doors this high percentage of humidity immediately condenses into moisture within the cloth and the clothing feels chilly. The effect is just like stepping out of doors in damp clothing.

Vapor Travel

Professor L. G. Miller of Michigan State College has pointed out another interesting feature of humidity. If we maintain an indoor temperature of 70 degrees and 40 per cent relative humidity while outside temperatures are near zero we have a high vapor pressure indoors. The vapor flows from areas of high pressure to areas of lower pressure. In other words vapor passes from inside our house to the outdoors. Professor Miller has found that with a difference in vapor pressure about equal to the above conditions the vapor will pass through automobile tube rubber ¼-inch thick.

What, then, happens in the walls of a house? The vapor is flowing from indoors to outside. It passes through the inside wall and through the stud space. When it strikes the cold outside wall the air temperature drops and some vapor must be condensed and deposited. It may form a film or even ice on the inside surface of the outside wall. If the wall is insulated this condensing moisture may fill the pores of the insulation. Whether or not this drastically reduces the insulating efficiency of the insulating material remains to be studied. Some say yes—others no.

However, this moisture is condensed and deposited. Let us say this goes on all winter. Spring comes with higher temperatures and more moisture in the air. The direction of vapor flow is reversed and we may have wet spots on our inside walls. This may even occur on a winter day when our conditions reverse; or on a south wall under a bright sun.

We bring up these points—not to discourage selling humidification—but to point out that humidifying a residence is not the off-handed problem owners have been led to believe.

Contractors Sidestep Guarantees

Many contractors have told us that humidification is accompanied by so much grief that they side-step the whole proposition; install the humidification apparatus accompanying their furnace and guarantee nothing. Others have said that the whole proposition has become a lot of hooey—the claims of manufacturers vying with medical recommendations to see which can be the most absurd.

The truth seems to be that we can give *adequate* humidification and with the cooperation of the owner give a sensible guarantee.

Some Field Tests

In order to determine just what can be done we sent to a selected group of contractors last winter various types of humidifiers and apparatus to record the results obtained. We placed apparatus on gravity installations and on forced air furnaces. Immediately we found that the only recording apparatus which gives day-in and day-out accuracy regardless of time or place or conditions of test is the sling psychrometer. Twenty-four hour recorders proved satisfactory providing the instrument was acclimated and calibrated. Where this was not carefully done, the records were not accurate.

During the course of the tests various types of humidifying apparatus were tried out. There were spray units, pan evaporators, steam jets; units were placed in the blower box, above the furnace, in the cold air shoe.

Preliminary Findings

Most of the tests did not result in operating records which will bear scrutiny. Enough tests did give results, however, that a report may be interesting, although proving little.

Following is a report from an engineer with a gas fired, forced air furnace, using a pan evaporative type of humidifier and recorded with calibrated thermometers and a sling psychrometer. The tests covered more than a month and a half as indicated. The conditions of the test are placed in parallel columns with date, time

(*Continued on page* 78)

Forced Air Heating Facts From the Research Residence—

Draft Control

By S. Konzo

Special Research Associate
Engineering Experiment Station
University of Illinois

IN THE preceding issue the following items were considered:

II. Chimney Measurements.
  a. Available draft in chimney.
    1. Action of chimney.
    2. Theoretical draft.
    3. Draft Relationships.
    4. Chimney Size Requirements.

In this issue the following additional items will be considered.

  b. Setting of Balancing draft dampers.
  c. Back-Draft Diverters.
  d. Inspection of chimney.
  e. Moisture condensation in chimney.

Setting Balancing Draft Dampers

Draft regulators, or balanced dampers, are an essential part of every oil-burning furnace installation and to a lesser extent of stoker-fired furnaces. It has been demonstrated from tests made by A. H. Senner that large drafts in the combustion chamber of an oil-burning furnace are conducive of larger flue losses.

For example, if the air adjustment to the oil burner is regulated so that the CO_2 percentage is 10 per cent when the draft in the combustion chamber is 0.02 inches, then a larger draft which may be created by a strong wind action at the top of the chimney, will tend to pull in a larger amount of excess basement air into the burner. This larger amount of excess air dilutes the combustion products, diminishes the percentage of CO_2, reduces the temperature of the hot gases, and results in larger flue gas losses. If the larger draft is created during the off-periods of the burner, the air that is pulled into the furnace tends to cool off the furnace more rapidly. Hence, during both the on-periods and off-periods of the burner, the draft in the combustion chamber should be maintained at a minimum value which is just sufficient to remove the gases from the furnace. A value of 0.02 in. draft in the combustion chamber is usually specified in practice.

The function of the draft regulator, or balanced damper, is to automatically actuate the check opening in the smoke-pipe so that under conditions of large draft, basement air will be drawn directly into the smoke-pipe rather than through the burner and

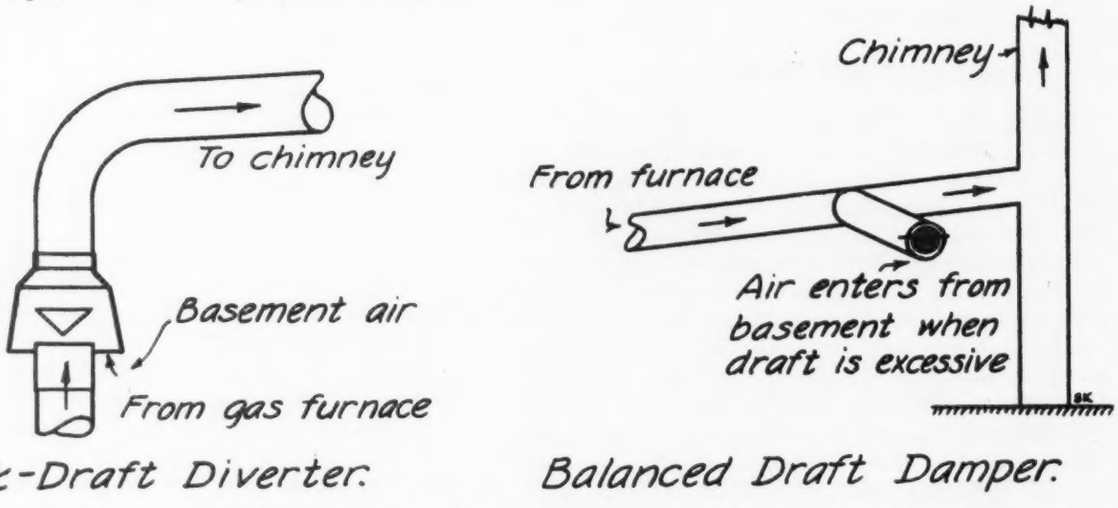
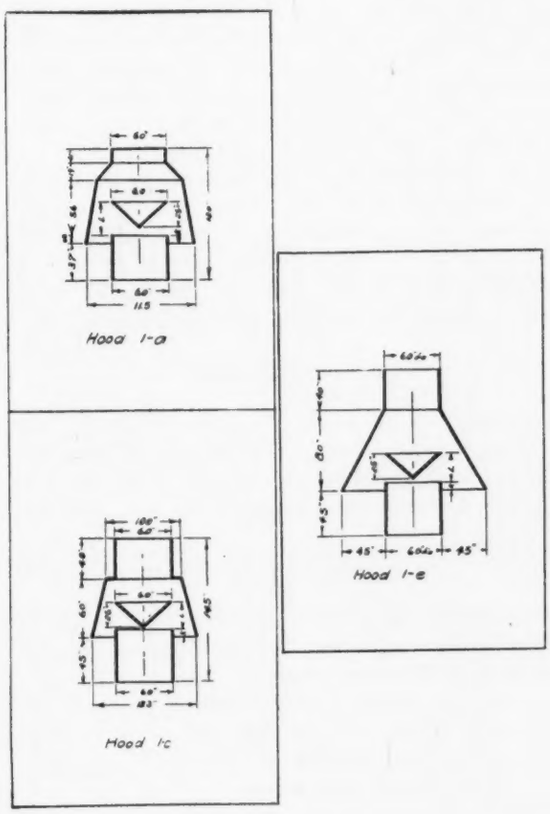
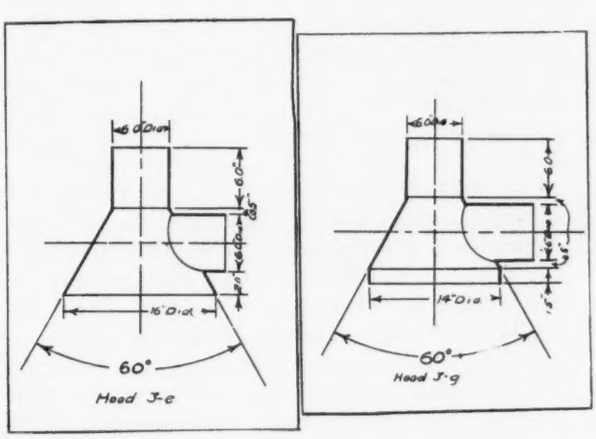


Fig. 1—Diagrammatic sketch of a balanced draft damper in a pipe "T" as used for oil or stoker firing and a draft diverter used with a gas furnace.

furnace. The balanced damper type of draft regulator, which is most commonly used in oil burner installations, should be adjusted with the aid of a draft gage. One end of the draft gage should be connected to a tube inserted in the combustion chamber and the other end should be exposed to the basement atmosphere. The adjustment in the balanced damper should be made so that the draft gage records 0.02 in. when the burner is on. It should be noted that in case a cross-damper in the smoke-pipe is used, it should always be installed between the furnace and the adjustable damper.





There are commercial devices on the market that serve to close off the chimney or smoke-pipe when the burner ceases operation. These devices, which attempt to reduce the off-period stack losses, should be installed and controlled so that under no conditions can the burner operate while the smoke-pipe is closed to the flow of the flue gases. Some reduction in the loss of warm basement air up the chimney may be accomplished by making a duct connection from the outdoors to the inlet of the balanced damper.

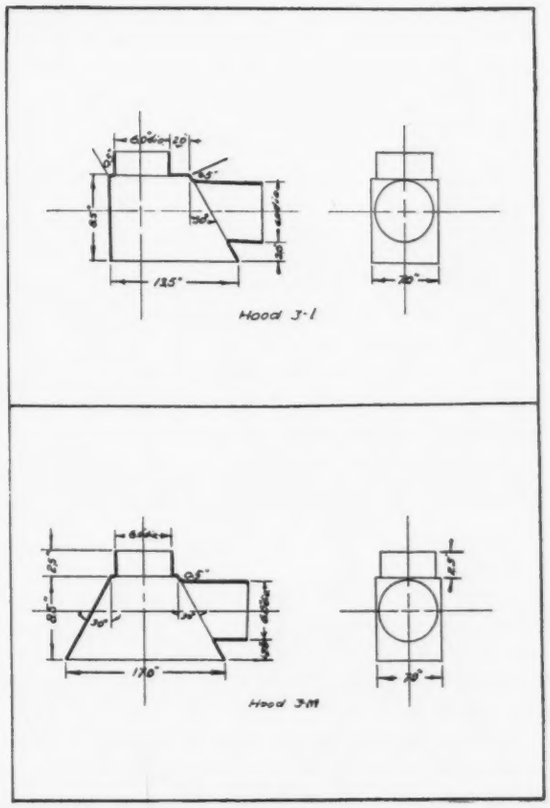


Fig. 2—Above and to the left group of acceptable forms of draft diverters. (From L. C. Price, University of Arkansas Bulletin 13.) Dimensions not legible will be furnished upon request.

The use of automatic draft dampers for coal-fired installations is somewhat limited since in many cases the draft is insufficient rather than excessive. However, in those installations where an excessive draft condition is encountered, an automatic draft regulator may be used to advantage.

Back-Draft Diverters

It may be observed that in the case of the balanced draft damper (Fig. 1) the flue gas products from the combustion of oil should never be permitted to escape into the basement. However, in the case of the draft diverters, which are an essential part of every gas-burning furnace installation, the diverter is purposely designed so that in case of flue stoppage the flue gas products may escape into the basement. No particular harm will result from such emergency conditions provided that the combustion process is complete. The very rigid tests imposed by the laboratories of the American Gas Association on all gas-burning furnaces, particularly in regards to the allowable trace of carbon monoxide in the flue gases, serves to eliminate those units which cannot meet the requirements for complete combustion under all conditions of operation.

The tests by Prof. L. C. Price ("A Study of Draft Hood Performance" Univ. of Arkansas Bulletin No. 13, May, 1935) have shown that draft diverters of the types shown in Fig. 2 are best adapted for the purposes of:

a. Preventing incomplete combustion from lack of draft.
b. Preventing partial stoppage of flue from interfering with complete combustion.
c. Preventing the pilot and burner from blowing out when a strong back draft is produced in the chimney.
d. Preventing variable drafts from affecting the combustion process.
e. Reducing the condensation of water vapor in the chimney.
f. Reducing losses due to excess air.

The following direct quotation is from the study by Prof. L. C. Price:

"The test results as a whole seem to indicate that it is entirely possible to design and make draft hoods of any of the four types (vertical, vertical-horizontal, horizontal-vertical, and horizontal) which will, within the limits of experimental error, fulfill the ideal requirements. Furthermore, scrutiny of the test results and of the diagrams will show that the best-performing hoods of all types have certain characteristics in common. They provide ample room for the passage of combustion products both up the chimney and to the atmosphere; the chimney opening being above, the combustion products prefer that way of exit. They all provide that air drawn from the surrounding atmosphere by updrafts shall pass in a slow and orderly fashion by the inlet openings of the hoods, so that only negligible venturi effect is produced. They all have baffles of ample size so as to prevent downdrafts from impinging on the inlet opening and so opposing the entrance of the combustion products. All have ample room for down currents to pass to atmosphere without building up pressure in the hoods. Hoods number 1-A, 1-C, 1-E, 3-E, 3-G, 3-L, 3-M, 4-C, and 4-D, all possess these characteristics, and all showed good results, both as to spillage and in maintaining a nearly constant rate of air flow with changing draft.

"The poor results shown by some of the hoods will indicate the danger in using hoods of untried design, and more especially the danger inherent in such make-shift schemes as simply cutting a hole in the flue and relying on it to protect the fire as would a good draft hood."

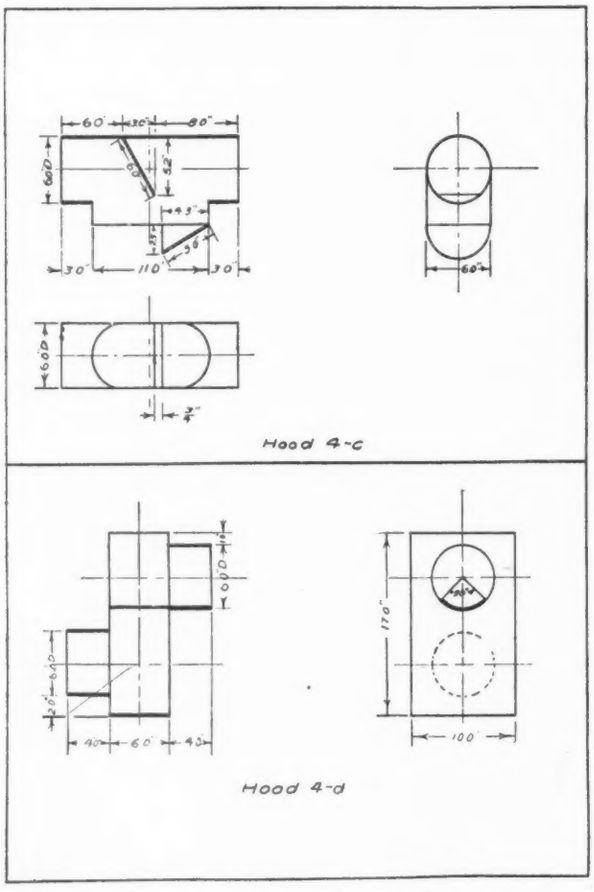


Fig 2—Additional forms of acceptable draft diverters from University of Arkansas Bulletin 13.

Inspection of Chimney

The paper by Prof. A. P. Kratz ("Use of the Draft Gage for Testing Chimneys in Warm Air Heating Plants," American Artisan, Vol. 90, No. 26) gives a complete summary of the common causes of poor draft.

The following quotation is an excerpt from the paper:

"Practically all of the defects which result in failure to secure proper draft in chimneys may be classified under four heads:

(1) Cooling of the chimney gases.
(2) Excessive friction.
(3) Wind effects.
(4) Insufficient height.

"Since the draft is caused by the difference in weight between the hot gases in the chimney and the cooler air outside, any reduction in the gas temperature will cause an increase in the density of the gases and correspondingly reduce the draft. Hence, thin walls, especially with an outside chimney, may seriously affect its performance.

"Air leakage also reduces the draft both by cooling the gases and by adding its volume to the amount of gas the chimney is required to carry. The most fruitful sources of air leakage may be enumerated as follows:

(a) Through chimney cracks.
(b) Through porous or poorly made joints in the brick work.
(c) Between the lining and the brick work, and between the joints in the lining.
(d) Through openings made in the chimney for gas heaters or laundry stoves, etc.
(e) Through the clean-out door at base of chimney.

(*Continued on page* 80)

Oil Burning Furnaces

(*Continued from page* 53)

unit, the total electrical input to the fan was approximately 8 per cent greater. This difference can be accounted for by the fact that, due to the greater resistance to air flow in the case of the oil-burning furnace and also due to slight differences in motor characteristics, the rate of electrical input to the fan motor for the oil-burning furnace was approximately 25 per cent greater than that to the fan motor for the conversion unit.

For a day in which the temperature difference between indoors and outdoors was 33 F, the combined electrical energy inputs to the fan and burner motors

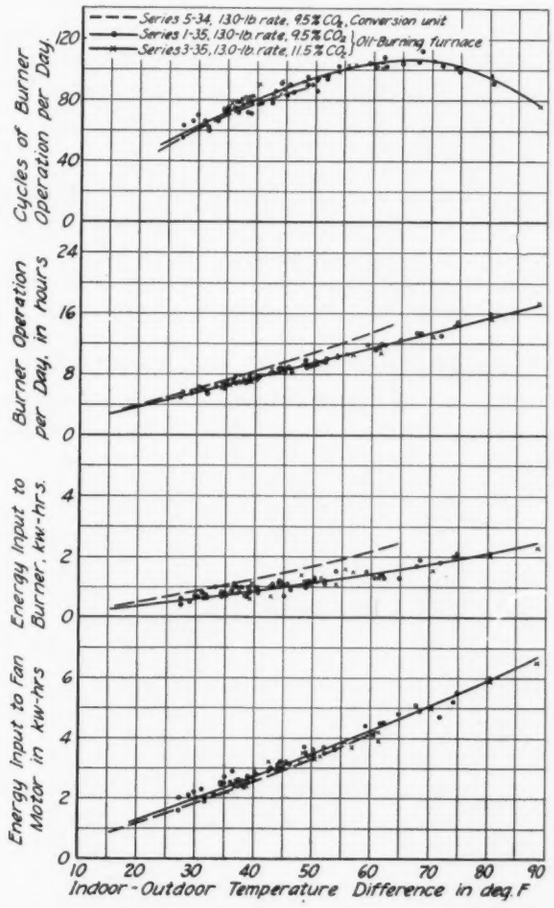


Fig. 13—Performance data for burner and fan operation in Research Residence, oil furnace, forced-air heating system. Season 1935-36, Inst. 16

were 3.1 kwhr for the conversion unit and 2.9 kwhr for the oil-burning furnace, or a net difference of 0.2 kwhr per day. The difference was greater for days having greater heat demand. The operation of the oil-burning furnace resulted, therefore, in a net reduction in fuel oil of 11.5 lb and a net reduction in electrical energy of 0.2 kwhr per day. Based on unit costs of 7 cents per gallon for fuel oil and 3.1 cents per kwhr for electrical energy, these reductions were equivalent to 10.9 cents per day for fuel and 0.6 cents per day for

electrical energy, or a total of 11.5 cents per day. For an average heating season consisting of 210 days this is equivalent to a difference in net operating costs of approximately $24. It may be concluded from these tests that under identical conditions of operation, the best economy was secured with the furnace which was equipped with ample heating surface and which was designed specifically for oil burning.

Variations in CO_2 in Flue Gas

In order to determine the operating characteristics of the oil-burning furnace when the fuel was burned under the best attainable combustion conditions, the air inlet to the burner was adjusted until a value of 11.5 per cent CO_2 in the flue gas was obtained. It was not possible to increase the CO_2 content much beyond this value without obtaining some indication of unburned combustibles. Otherwise, the operating conditions were maintained the same as in the previous tests; namely with 1675 cfm air circulated, 13.0-lb oil rate, and 0.02 in. draft in the combustion chamber. The results obtained from this test are shown in Figs. 12 and 13 in which the points are designated as belonging to Series 3-35. In general, no appreciable difference, either in fuel consumption or plant operation, was obtained when the CO_2 content in the flue gas was increased from 9.5 per cent to 11.5 per cent. However, when the heat demands of the house were large, there was a slight tendency towards an improvement in conditions with the higher CO_2 content. These results are in substantial agreement with those obtained from the tests made under conditions of continuous operation, as shown in Fig. 8. For example, for an oil input rate of 12.84 lb per hour, the increase in bonnet efficiency was approximately 1.5 per cent when the CO_2 content was increased from 9.5 per cent to 11.5 per cent. For all practical purposes the results obtained with the two conditions of combustion may be regarded as identical.

These results serve to emphasize the statement previously made that an oil-burning furnace which is provided with sufficient effective heating surface should perform satisfactorily notwithstanding fairly wide deviations in the CO_2 content of the flue gas.

Part 3 to follow

◆

Figuring Heat Loss

(*Continued from page* 55)

Frame, single windows, weatherstrips, no insulation	.090
Frame, storm windows, weatherstrips, no insulation	.065

The above are *only* for 2 story houses, with sun porches. Factors should be calculated as shown on the form. And the factors for wall, roof and window to obtain the overall factor. Add 5% for sun porches. Add 5% for unusual exposure to high wind velocity.

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. . . and like any other champion the RYBOLT Air Conditioning Unit has earned its laurels by staying out in front. Furnace men the nation over have learned from more than a quarter of a century of dealings with us that every RYBOLT furnace is a winner. They know that its performance . . . its efficiency . . . its quality . . . its price . . . and last but not least, its appearance . . . are all tops.

You'll enjoy a much more profitable heating season if you'll specify and install a RYBOLT Winter Air Conditioning Unit on those new and replacement jobs. String along with the champ and come home with a winner. Write us now for further information.

REGULAR EQUIPMENT

Furnace . . . Furnace Casing . . . Blower Cabinet . . . Blower Motor with variable speed drive Blower Switch . . . Filters . . . Humidifier

The Rybolt Heater Company

Ashland : : Ohio

Technical Code

(*Continued from page* 58)

This completes the middle portion of the data sheet.

With our warm air supply pipes all corrected and our returns likewise properly sized we are ready to gather our branches together and work our trunks back to the furnace. This we do in the section items 53 to 65. Note in the data sheet that there are three groups of pipes. These have been arranged according to the trunks. For instance we have two warm air trunks. On one trunk we have supply registers 1, 2, 3, 4, 5, 6, 7. On the other trunk registers 8, 9, 10, 11, 12. On the return trunk we have placed all faces as two branches of one trunk.

Sizing the Trunk Line

On our first trunk (registers 1 to 7, inclusive) we start off with the register at the end of the line. This branch pipe has no other branch so it is really a main trunk section. So in the first column we write stack number 1 and calling it a main trunk fill in the third column 122 cfm from item 36 above. In column 4 we enter the round pipe size before correction 7.4 inches from item 37. In order to correct the trunk line to maintain our selected resistance of .06 inch we must correct these round pipe sizes by multiplying by the correction factor of the branch. The correction factor for 7.4 inches as shown in item 38 is .835 so we enter this under column 5. We multiply 7.4 by .835 and get 6.2 which we enter in column 6 as shown. From Table 8 we change this 6.2 round pipe to a rectangular duct of equal resistance and 8 inches deep (which we have chosen for all our ducts) and in Table 8 find a 5 by 8 inch duct to be the nearest to a 6.2 inch round pipe.

Sizing an Example

It may be well at this point to go back to the explanation of this procedure as given in the code. The code says (item k, sec. 2, article 6)—

Item (k) Sizing trunk lines, in round pipe diameters.

Starting at the extreme end of the trunk line and working toward the heater unit, add the cfm of the first two or more branches joining at that point. Find the diameter of the trunk for that point from Table 6 using desired design static. To the cfm at this point add the cfm of the next branch joining the trunk and find the diameter of the trunk at this new location. In like manner add the cfm of each succeeding branch to the cfm of the duct at point of juncture.

Example 10. Analysis of one complete run. (Fig. 2 on next page.)

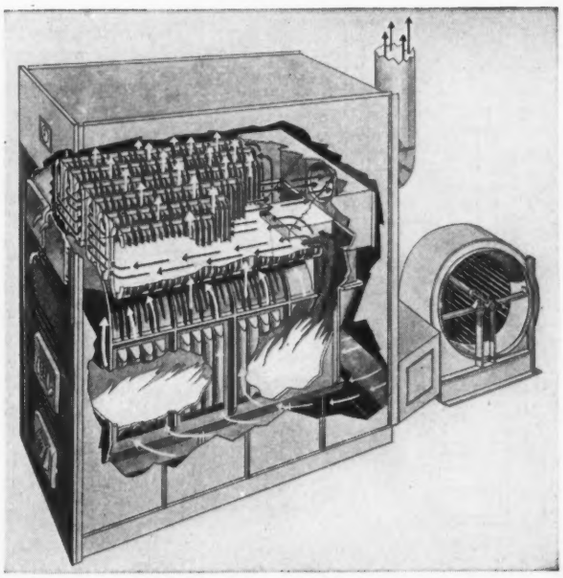
Referring to Diagrams A and B, Fig. 2, and Example 2, assume the run A to be the end run of the trunk line. This run must handle 100 cfm and its equivadent length is 117 (use 120) feet. Assuming a design static of .06 the round pipe diameter is 6.8, see Table 6. From Table 9 (correction table) 6.8 × 1.035 = 7.038 (say 7.1) inches, the corrected round pipe diameter of the branch.

Adding the 300 cfm of the first branch (B) to join the 100 cfm of the branch A we find a total of 400 cfm. From Table 6, 400 cfm at .06 static gives a pipe 11.4" in diameter. 11.4 × 1.035 = 11.799 (say 11.8) inches, the corrected pipe diameter.

Adding the 500 cfm of C to the 400 cfm of A and B we have 900 cfm. 900 cfm at .06 static gives a pipe 15.5 inches in diameter. 15.5 × 1.035 = 16.04 (say 16.0), the corrected pipe diameter. In like manner 200 cfm at D plus 900 cfm of A+ B + C = 1100 cfm. 1100 cfm at .06 = 16.75. 16.75 × 1.035 = 17.35 (say 17.4), the diameter of trunk line at furnace.

The ACME HEATER

"It's in the Fins"



PHYSICAL DATA—LARGE SERIES

Size No.	Dimensions Length	Width	Height	Grate sq. ft.	Heat Surf. sq. ft.	Free Area sq. ft. Min.	Free Area sq. ft. Max.	Wt. Lbs.	Max. Capacity Btu.
7	6'-6"	4'-0"	7'-0"	10.31	260	6.55	10.25	5900	900,000
8	8'-1"	4'-0"	7'-0"	11.91	340	7.73	12.50	7000	1,100,000
9	9'-8"	4'-0"	7'-0"	13.06	430	8.91	14.75	8000	1,300,000
10	11'-3"	4'-0"	7'-0"	14.43	500	15.82	22.62	9300	1,500,000
JUNIOR SERIES									
2	4'-6"	3'-6"	5'-8"	3.9	136	4.7	4.7	3200	350,000
3	6'-0"	3'-6"	5'-8"	6.1	183	5.9	6.9	4800	527,000
4	7'-6"	3'-6"	5'-8"	7.2	230	7.1	9.1	5000	634,000
5	9'-0"	3'-6"	5'-8"	9.3	280	8.3	11.3	6000	800,000

Note: For Automatic Firing Add 10% to Ratings Given.

Burns Any Kind of Fuel

The design of an all cast iron, direct transmission heater, such as the Acme, is not dependent upon the kind of fuel to be used. Any type of fuel may be burned. Suitable grates may be provided so that bituminous, semi-bituminous, anthracite coal, or other solids may be used with equal efficiency. Replacement of grates and linings by proper refractory material permits the use of automatic stokers on oil burning equipment.

Large Combustion Chamber

The Acme Heater provides ample space for the ignition of gases of combustion, regardless of the kind of fuel used. The unusually large combustion chamber, acting as "primary" heating surface, effects a very efficient transfer of heat, because of the great temperature difference between the burning gases inside the chamber and the air passing over the outside surface.

Efficient Radiator Section

Although the heating surface of the combustion chamber is large and efficient, still more heat must be extracted to obtain satisfactory overall efficiency. An inspection of the "phantom view" above will reveal how the gases of combustion enter the rear smoke chamber, flow to the front of the heater, and return again to the smoke-box. It is evident that the gases are held in intimate contact with the heating surface, six times the length of the heater, before they are permitted to escape.

High Ratio of Heating Surface to Grate Area

The radiator tubes are covered with extended surfaces, or fins, typical of those used on indirect heating coils. The long, oval tubes of the radiator provide an exceptionally large heating surface and, when combined with the surface of the combustion chamber, afford a remarkably high ratio of heating surface to grate area.

Balanced Construction

The construction of the Acme Heater provides ample free area and allows proper velocity of the air to be heated. Moreover, this air is brought into direct contact with as much heating surface as possible, resulting in the Acme of Efficiency.

ACME HEATING & VENTILATING CO., Inc.

4224 LOWE AVENUE CHICAGO, ILL.

Play Safe!

SELECT A BLOWER FILTER UNIT YOU CAN DEPEND UPON!

Every furnace man knows that a furnace must breathe . . . that when a blower is connected to a furnace, air for breathing is supplied by the blower when operating. But suppose, due to unavoidable causes, such as current failure, the blower failed to operate. Naturally, the furnace would overheat—and an overheated furnace is dangerous . . . may crack the fire-pot, even cause fire in the home. Be wise! Play Safe! Select REX AIR-PAK.

You Can Depend Upon

REX AIR-PAK!

Because REX AIR-PAK has Automatic Louvres which permit instant change from forced air to gravity flow, you can depend upon it to operate the furnace safely at all times. Automatic Louvres open when blower is stopped, allowing natural gravity circulation, and close when blower is started.

- REX AIR-PAK also has the new 4-speed pulley for year around efficiency.
- REX AIR-PAK filters are sealed against dust leakage.
- REX AIR-PAK is exceptionally quiet because bearings are floated on rubber.
- REX AIR-PAK blower filter units are priced right for good profit.

Write Today for Complete Information

Air CONTROLS INC.

DIV. OF

THE CLEVELAND HEATER CO.

1935 West 114th St. Cleveland, Ohio

Item (1) In order to correct the trunk line to bring about the design static regardless of its length, it is necessary to multiply the diameter of the trunk between branches by a common correction factor. This factor is the same factor used in correcting the diameter of the branch with the greatest equivalent length, regardless of the point of intersection with this trunk.

Should two trunk lines merge, treat each as individual trunks to point of intersection. Total cfm of each trunk at this point and proceed as one trunk.

If there are two or more trunk lines to the furnace, design and correct each trunk as outlined above.

Now going back to our data sheet we have accounted for the supply branch to stack number 1. The next branch is for stack number 2 and again we have no branch from this run so we enter in column 3 the 85 cfm from item 36; the pipe size before correction 6.4 inches from item 37; the correction factor .835 from item 38; the round pipe size corrected from item 39 and our rectangular duct size 4 by 8 inches from Table 8.

Now in item 55 we gather these two branches together to form a section of trunk. We add the cfm's for stacks 1 and 2 (122 plus 85) equals 207 cfm and enter this in column 3 of item 55. From Table 6 under our .06 resistance column we find the nearest cfm to 207 which is 210 and find our uncorrected round pipe size to be 8.9 inches. This is entered in column 4. This size must be corrected and the code says the correction factor is the same as the factor for the branch having the longest equivalent length. In this case our equivalent lengths are just about the same (36 and 37 feet from item 33) so our factor is .835.

We multiply the 8.9 inches in column 4 by .835 which we have entered in column 5, item 55 and get 7.5 inches. From Table 8 we find our rectangular size is 6 by 8 inches and enter this in column 7.

Figure 2

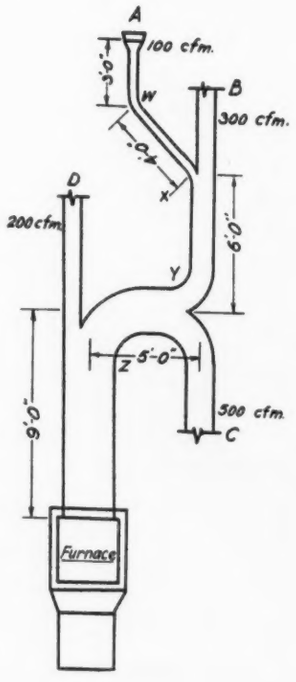


Diagram A

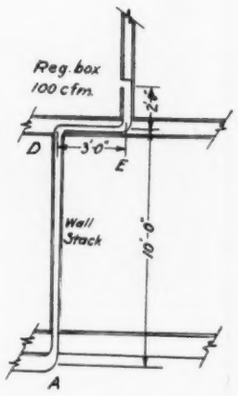


Diagram B

Our next branch is from stack number 3, item 56 and we enter the cfm (67) from item 36 in column 3, as again we have no branch. The uncorrected round pipe size from item 37 is 5.9 inches—entered in column 4; the correction factor from item 38 is .93—entered in column 5; the corrected round pipe size is 5.5 inches from item 39—entered in column 6; the rectangular duct is 4 by 8 inches from Table 8.

Again in item 57 we bring these branches together as a trunk. In column 3 we add 207 cfm plus 67 cfm and place the total of 274 cfm in column 3, item 57. Our round pipe size before correction is 9.9 inches from Table 6. Our correction factor is .93 since stack 3 has a longer equivalent length (65 feet, item 33) than the 37 feet of stack 1. The correction factor .93 of column 5 multiplied by the uncorrected pipe size 9.9 inches of column 4 gives a 9.2 inch pipe entered in column 6. The rectangular size from Table 8 is 9 by 8 inches, placed in column 7.

The next branch from stack 4, item 58, has a cfm of 133 from item 36 entered in column 3; the uncorrected round pipe size from item 37 is 7.6 inches; the correction factor is .63 from item 38; the corrected round pipe size is 4.8 from item 39; the rectangular pipe size is 4 by 8 inches from Table 8.

Sizing a Main Trunk

In item 59 we gather these pipes together for another main duct section. We add the cfm's of stack 4 to the main ahead of it (133 plus 274) equals 407 cfm in item 59, column 3. The uncorrected round pipe size from Table 6 shows 410 cfm closest calling for a 11.5-inch round pipe entered in column 4. The correction factor is for our main in item 57 plus the branch in item 56 and is .93, column 5. Multiplying 11.5 by .93 we get 10.7 inches entered in column 6, item 59. From Table 8 our rectangular pipe size for equal friction is 12 by 8 inches, column 7.

The next branch is for stack number 5, column 1, item 60; the cfm from item 36 is 93 cfm; the uncorrected round pipe size is 6.7 inches from item 37. The correction factor is .905 from item 38; the corrected round pipe size is 6.1 inches; the rectangular pipe size is 4 by 8 inches.

Now we have a short section of main duct which carries air for branch 5, just entered, plus air for stacks 1, 2, 3, 4. As item 61 we add the cfm for stack 5 to the volume for stacks 1, 2, 3, 4 and get 93 plus 407 equals 500 cfm, entered as item 61, column 3. The round pipe, uncorrected, under .06 resistance in Table 6, is 505 cfm and 12.4 inches, column 4. The correction factor is .93 since branch 3 is still our longest equivalent length, entered in column 5. Multiplying 12.4 inches by .93 we get 11.6 inches entered in column 6 and the rectangular pipe size is 15 by 8 inches.

Now we come to a part of the trunk where two branches come off a single opening from our main. Hence we have a branch of a branch and we designate this by placing the cfm's for stacks 7 and 8 in column 2 for branch pipes.

As item 62 we enter stack 7 (the farthest out)

with 107 cfm from item 36 in column 2. We skip column 3 and enter our uncorrected round pipe size as 7.0 inches in column 4 from item 37. Our correction factor is .93 from item 38 we place in column 5 and the corrected round pipe size of 6.5 inches from item 39 in column 6. The rectangular duct is 5 by 8 inches from Table 8.

As item 63 we enter in column 2 the other branch for stack 6 as 69 cfm from item 36; in column 4 the uncorrected round pipe size of 5.8 inches from item 37; the correction factor of .905 from item 38 in column 5; the corrected round pipe size of 5.4 inches from item 39 in column 6 and the rectangular pipe size of 4 by 8 inches in column 7.

Now we have all branches from this trunk accounted for and we are considering the main trunk at the bonnet. As item 64 we bring together the pipes for stacks 6 and 7 and since this is a main duct we add the cfm's of items 62 and 63 and place the sum of 176 cfm in column 3. The round pipe size uncorrected for 176 cfm is 8.5 and the correction factor is still .93. In column 6 we place the result of multiplying column 4 by column 5 to get 7.9 inches and in column 7 the rectangular size is shown as 7 by 8 inches.

Trunk at Bonnet

The trunk which comes off the bonnet must be large enough to carry all the air for stacks 1 to 7 inclusive so as item 65 we add our cfm for stacks 6 and 7 to the volume of the trunk and get 676 cfm entered in column 3. From Table 6 our uncorrected round pipe size is found to be 13.9 inches and our correction factor remains .93. Multiplying out we enter in column 6 the 13.0 inch corrected round pipe size and convert this to rectangular for equal friction in column 7—18 by 8 inches.

This 18 by 8 inches is our duct off the bonnet.

Step by step we have, now, sized one trunk from the bonnet. The smaller trunk is sized in the same fashion. The return system is handled just the same and we have these step-by-step sizings arranged on our data sheet as individual trunks.

Looking at the data sheet we see that the return system consists of three legs. The longest run (that serving returns R-1 and R-6) has been considered as the main trunk from bonnet to return face. That run of return pipe which collects R-2 and R-5 is considered as a branch of R-1—R-6. Accordingly R-1—R-6 is entered in the column for trunk lines and R-2—R-5 is entered in the column for branches. These two runs are then brought together in item 59 and the recreation room is added. These are again totalled in item 61. The run of pipe R-3—R-4 is treated as a separate main as shown in items 62, 63.

The total volume of air handled by the return system is 1091 cfm. The total volume of air for the two supply mains is 676 plus 557 cfm or 1233 cfm.

The only thing remaining to do now is to select a fan capable of moving the volume of air required *at the total resistance of our system.* To find the resistance the code says—

Item (o) Total resistance of entire system.

To find the total resistance of the entire system, it is necessary to add together the resistances offered by every portion of the entire system.

As the warm air and return air sides of the system are designed on a definite static pressure, and all runs corrected to offer this same static pressure, it is apparent that the design static of the circulating system is the sum of the two.

The *total* resistance against which the fan must operate is, therefore, the resistance of the circulating system, plus the resistance of that register on warm air and return having the greatest resistance, plus the resistances of the heater, filter (usually .05) washers, cooling coils, eliminators and other appurtenances.

Example 11.

Assuming the design static of each system (warm air and return) to be .08, add the following:

.08 (warm air side) + .08 (return air side) + .03 (assumed static of register offering greatest resistance on warm air side) + .02 (assumed resistance of register offering greatest resistance on return air side) + .05 (resistance of furnace) + .10 (resistance of filters, partially dirty) = .36 static resistance against which the blower must operate.

Item (p) Selection of Blowers.

The blower capacity at 65° return air should be the equivalent of, or greater than, the sum of the cfm required to supply all the outlets at the design Warm Air temperatures, and at the total pressure of the entire system. It is assumed that all blower ratings are in accordance with the Standard Test Code of the A. S. H. & V. E. Guide.

Advantages of Code

This completes our design. Perhaps it is well again to point out that this method may seem complicated at first, but when we have finished we have a system in which we can place the utmost confidence. Just to sum up, we have in the course of our step-by-step procedure taken into account these very important factors—

1—Established the heat loss of all constructions within the structure.

2—Accounted for differences in heat loss for walls below grade and those above grade.

3—Measured and accounted for every square foot of surface through which heat is lost.

4—Estimated infiltration according to the actual cracks in the doors and windows rather than guessing at this loss.

5—Taken into consideration every elbow, turn, transition in our piping system so that when the blower is turned on we will get the volume of air we figured from every register.

6—Acknowledged that there will be air temperature drop between bonnet and register and adjusted our air volume to compensate for these lower register air temperatures.

7—Corrected every foot of duct for resistance so that the resistance throughout is identical and known before the system is started.

8—Sized all our piping system to equal friction per foot of length, permitting velocities to change from section to section, but maintaining the all important "ceiling" on the resistance which makes for higher operating costs when not controlled.

◆

A. H. Schmissrauter Sheet Metal Works, 412 East 8th St., Chattanooga, Tennessee, has added a coal stoker department. Black Diamond automatic stokers are shown in a good floor display.

◆

The Cochran Air Conditioning Co., 1303 Lamar, Houston, of which B. B. Cochran is president, has been appointed exclusive South Texas distributor for the L. J. Mueller Furnace Co., Milwaukee.

◆

Harry Bros. Company of Louisiana, New Orleans, sheet metal producers, are building an addition to cost around $100,000.

Humidity Fallacies

(*Continued from page* 61)

of reading, inside and outside conditions and relative humidity obtained.

What can be ascertained from these tests? First that with a heating plant of this type and a pan evaporator, humidities in the range below the condensation point can be maintained. Second, that on cold days when it is presumed the furnace operated on a goodly portion of the time, humidities were below the much talked of 40 per cent. For example, there are four days showing 3 and 4 degrees above zero. On those four days relative humidities were 29, 34, 27 and 30 per cent. The four days of highest temperature were 25, 23, 21 and 20 degrees. On those days the relative humidity was 28, 38, 42 and 40 per cent. On only three days in the 14 days checked did the apparatus produce approximately 40 per cent.

Of some interest, also, is the variation in relative humidity from hour to hour. On February 2 the outside temperature

(*Continued on page* 85)

Date	Time	Dry Bulb Deg.	Wet Bulb Deg.	Relative Humidity Per Cent	Outside (Weather Bureau) Deg. Above	Remarks
Jan. 24	8.30 P.M.	73.5	53.0	23	6	Hum'r. "off"
Jan. 25	(Broke wet bulb therm. and had to suspend readings).					
Jan. 28	11.30 P.M.	67	51	32	15	
Jan. 29	7.00 A.M.	65	49	28	14	
Jan. 29	8.30 A.M.	70	53	30	14	
Jan. 29	9.00 P.M.	72	54	29	13	
Jan. 30	8.00 A.M.	68	51	30	19	
Jan. 30	9.00 P.M.	72	55	32	18	
Jan. 31	7.00 A.M.	65	49	29	3	
Jan. 31	8.30 A.M.	70	54	34	3	
Jan. 31	2.30 P.M.	75	54	22	9	
Jan. 31	7.00 P.M.	74	55	28	10	
Jan. 31	10.30 P.M.	73	54	27	8	
Feb. 2	9.30 A.M.	70	52	27	4	Hum'r. turned on
Feb. 2	1.00 P.M.	73	57.5	39	18	
Feb. 2	2.30 P.M.	73.5	59	42	21	
Feb. 2	6.00 P.M.	72	55	32	21	
Feb. 2	8.00 P.M.	73	58	40	20	
Feb. 2	11.30 P.M.	68	52.5	34	18	
Feb. 3	7.00 A.M.	64	49.5	34	18	
Feb. 8	8.00 A.M.	69	52	30	7	
Feb. 9	3.30 P.M.	74	58.5	38	23	
Feb. 10	7.00 A.M.	67	51	31	10	
Feb. 11	8.00 P.M.	74	55	28	16	
Feb. 11	11.00 P.M.	69	52	29	13	
Feb. 12	7.00 A.M.	64	48	28	11	
Feb. 12	11.00 P.M.	74	55	28	25	
Feb. 18	7.00 A.M.	64	51	40	13	
Feb. 18	9.00 P.M.	74	56	30	4	

Thermostat readings were generally from one to two degrees lower than the D.B. readings as taken.

Konzo—Draft Control

(*Continued from page* 64)

(f) Through cross connections between furnace flues and fireplace flues.

(g) Through openings at the bottom of partitions where several flues are built in one chimney.

(h) Through poorly fitting thimbles, which are very common.

"Excessive friction may be brought about by increase in the velocity of the gases caused by reduction of flue area, or by turbulence brought about by obstructions or abrupt bends in the chimney flue. The most characteristic sources of trouble in this respect are:

(a) Insufficient chimney flue area.
(b) Abrupt changes in direction.
(c) Reduction in area.
(d) Loose brick or other accumulations at bends.
(e) Broken flue linings.
(f) Soot and tar from certain coals.
(g) Smoke pipe extending partly across the flue where it enters the chimney at the thimble.

"If the top of the chimney is not carried well above the ridge of the roof, the wind may be directed over the top in such a manner that a back draft is produced, thus destroying the draft. Trees or other subjects located near the chimney may also produce this effect.

"Any one of the defects enumerated may not be sufficient to interfere very seriously with the action of the chimney, and where trouble is encountered it is usually caused by a combination of factors. In any case, the proper method of procedure is first to measure the draft by means of a draft gage. This gives very definite proof that the chimney either is or is not defective. When such proof is obtained, the remedy may then be found by a thorough examination and by the process of elimination, taking account of various possible defects which have been enumerated and listed."

Inspecting Chimney

An inspection of the condition in the inside of the chimney may be made by means of a mirror placed at the cleanout door. The mirror should be so tilted that daylight entering at the top of the chimney will be reflected into the eyes of the observer. The presence of obstructions, protruding pipes, accumulated soot and overhanging projections can be readily observed.

If there exists some doubt as to the tightness of the chimney and flue connections, a smudge fire should be built in the furnace. The check damper should be closed and a wet sack should be temporarily placed over the top of the chimney. Any leaks in the chimney or in the smoke-pipe can be

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2. Remove the Cause

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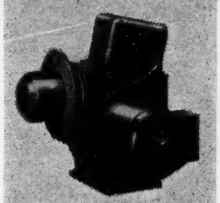

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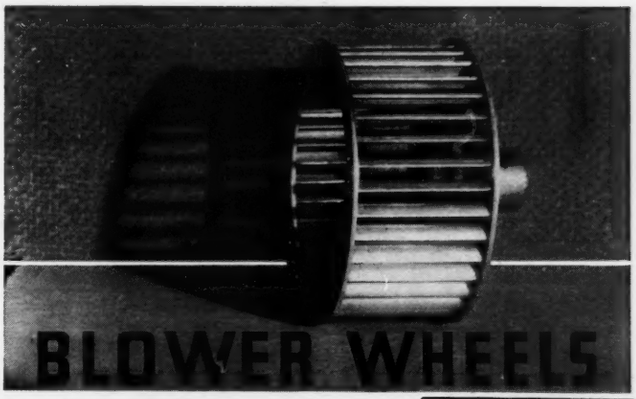

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For furnace manufacturers who buy wheels only, Clarage offers any size desired, and can meet any quantity requirement. Clarage Wheels can be furnished standard width, or any percentage of standard width to deliver a specified volume of air at any operating speed. All wheels are PERFECTLY BALANCED for quiet operation without vibration.

Clarage Furnace Fans (complete assemblies) combine many advantages. They are positive centrifugal type, very compact, highly efficient, and the low speeds insure SILENT OPERATION.

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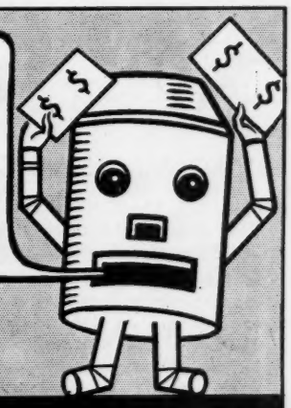

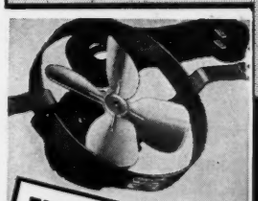

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707 Reading Road Cincinnati, Ohio

readily detected by the escape of smoke from the holes.

In addition the manner in which the smoke leaves the chimney should be observed. The conditions which tend to produce a back draft may be indicated by the direction of the flow of the smoke at the top of the chimney.

Condensation in Chimney

The problem of moisture condensation in the chimney is of importance to the designer of fuel-burning equipment, since a compromise must be effected between the securing of a high flue gas temperature to prevent condensation in the unit

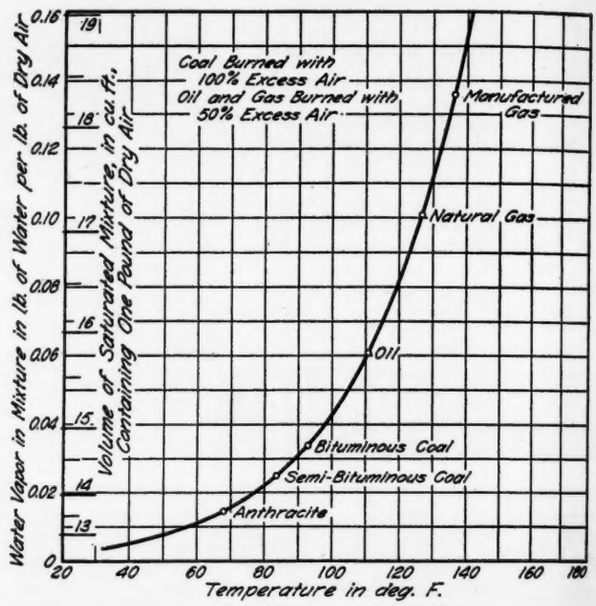
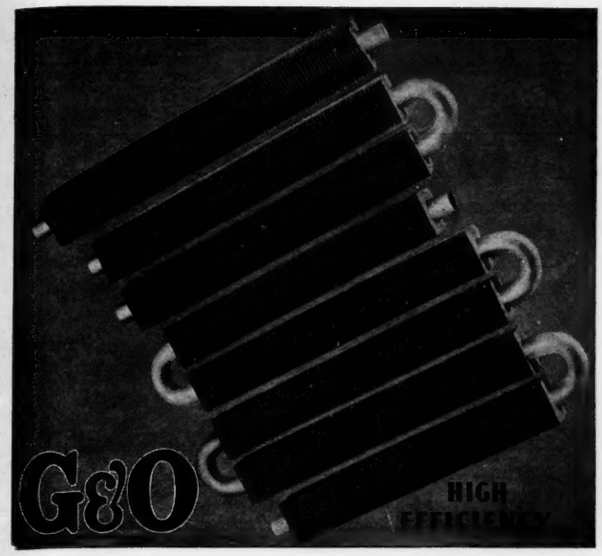


Fig. 3—Saturation curve showing dew points for combustion gases from various fuels. (University of Illinois Engineering Experiment Station Circular No. 22 by W. R. Morgan.)

and the smokepipe, and the securing of a low flue gas temperature for the purpose of obtaining maximum combustion efficiencies. The problem is of equal importance to the installer since the conditions promoting condensation in the smoke-pipe and chimney must not only be recognized, but also be avoided. In general, low temperatures of the flue gas leaving the furnace are conducive towards condensation of moisture in the chimney.

This subject is discussed in detail in University of Illinois, Engineering Experiment Station Circular No. 22, entitled "Condensation of Moisture in Flues" by W. R. Morgan. The following paragraph quoted from the paper defines dew point temperature:

> "When an unsaturated mixture (of air and water vapor) is cooled, condensation occurs at the temperature at which the partial pressure of the water vapor in the mixture is equal to the equilibrium pressure between water and its vapor at the same temperature, under which condition the mixture is said to be saturated. *The saturation*



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It will pass through any 24" door.
The inspection door may be faced in any one of four directions.
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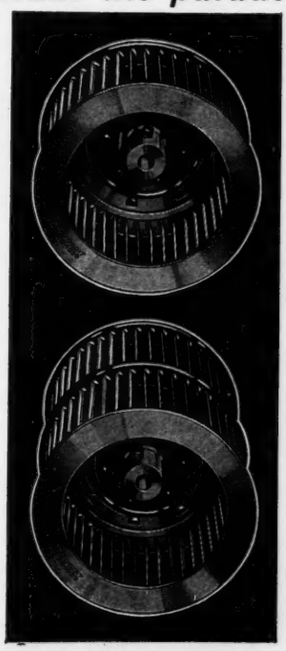

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temperature, which obviously is the temperature below which the mixture cannot be cooled without causing condensation, is called the dew point."

The data shown in Table 1 and in Figs. 3 and 4 are from the same source. The average temperature at which condensation will take place is shown in Table 1 and Fig. 3. It may be noted that the condensation temperatures for coal are exceedingly

Table 1. Condensation Temperatures

Type of Fuel	Average Temperature at which Condensation will take place, deg. F.
Anthracite	68
Semi-Bituminous Coal	84
Bituminous Coal	93
Oil	111
Natural Gas	127
Manufactured Gas	137

low. Since the temperature of the flue gas in ordinary domestic heating systems using coal usually exceeds 100 deg. F. even at the top of the chimney, the probability of obtaining moisture condensation in any part of the chimney are quite remote.

On the other hand, the flue gas temperatures obtained at the top of the chimney when gas is used as a fuel are frequently less than the dew

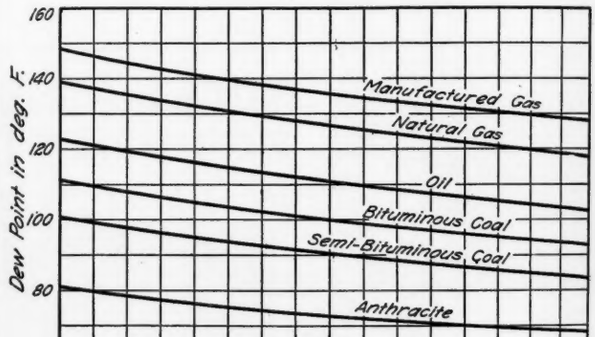


Fig. 4—Average relation between dew points and excess air for typical fuels. (From University of Illinois Engineering Experiment Station Circular No. 22 by W. R. Morgan.)

points shown for gas. In this connection it is of interest to note that conventional design practice limits the minimum temperature of the flue gas at the outlet of the furnace to a value of approximately 250 to 350 deg. F. That is, the amount of heating surface is limited so that the temperature of the flue gas leaving the furnace is well above the dew point, and the possibility of condensing moisture inside the heating unit is eliminated. It may also be noted that the greater amount of heat loss from an "outside" chimney, as compared with that from an "inside" chimney, is conducive towards lower flue gas temperatures and hence towards greater condensation.

"The difference between the water content at saturation for a given flue gas and that of the

mixture indicated by the curve of Fig. 3 for any lower temperature shows the amount of condensation which would occur if the flue gases were cooled over this range" (Morgan). Also, "Increase in excess air reduces the degree of saturation of the flue gases and, therefore, lowers the dewpoint (Figs. 1 and 3.) Hence an increase in excess air would tend to decrease condensation."

In any given installation, the reduction or elimination of moisture condensation consists either in increasing the temperature of the flue gas or in increasing the excess air. The use of tall, exposed, metal flues is not recommended, particularly for gas-fired installations. Outside chimneys which are exposed on one or more sides may give trouble. The use of back-draft diverters, which introduce excess air into the chimney, is recommended. In some cases, condensation inside the unit and in the smoke-pipe has been obtained during those periods when the unit is infrequently operated and only the pilot is in operation. Definite provisions should be made in such cases to provide for a pan to catch the condensation and a drip line to dispose of the solution. The use of tile-lined chimneys in new homes is also recommended. Some installers have found it advisable to install corrosion resisting metal liners inside the chimney. These remedial measures may not be necessary in a properly installed and properly adjusted heating system, but the installer should be cognizant of the fact that the appearance of any condensation demands prompt attention. It is recommended that the chimney and smoke-pipe of newly installed units be carefully examined for traces of moisture condensation.

It has been observed in the case of furnaces which are infrequently used, as in many church installations, that the ordinary galvanized iron smoke-pipe is subjected to severe corrosive action. The long inert periods between the firing of the furnace, and the damp conditions which are usually found in basements of such installations are favorable to rapid deterioration of the smoke-pipe. The additional cost of using a better grade of smoke-pipe, made of cast-iron or corrosion resisting metals, may well be justified.

Humidity Tests

(*Continued from page* 78)

ranged between 4 and 21 degrees above zero. During the same time the humidity ranged between 27 and 42 per cent with 34 to 40 per cent during the afternoon and evening. On January 31 outside temperatures were from 3 to 10 above zero and relative humidities between 27 and 34 per cent omitting the one stray.

Comparing these records with Fig. 1 it appears that on Jan. 31, with outside temperatures from 3 to 10 degrees above zero, inside relative humidities were much above the condensation point for single glass and just about on the line for double glazed sash. If all windows in this house had been equipped with sealed storm sash higher humidities could have been carried without condensation, but the apparatus did not produce such humidities.

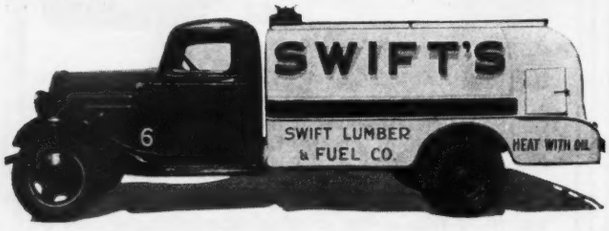
[*Part 2 to follow*]

Selling Oil Burners

(*Continued from page* 59)

in size from a fifty-gallon oil barrel to a three thousand gallon tank, and the shapes, in some instances at least, were weird and grotesque.

Knowledge of oil burning by the seller or the purchaser was at absolute zero, and if an occasional job proved to be reasonably satisfactory, it was purely accidental. Gravity oil burners of all sizes and shapes were installed indiscriminately in all kinds of plants without regard to size, draft, number of feet of radiation, or, in fact, anything. We, as an oil merchant, were supposed to supply oil to this equipment that would heat the premises adequately and economically.



We, of course, soon found that we must give service on this equipment. We could, of course, choose between pumping the oil out of tanks, and returning it to our yards, thereby losing the customer, or sending someone down to clean and adjust the burner to burn the oil we had delivered. Distillate in those days sold from 8 to 9 cents per gallon, and, of course, in many instances proved to be entirely too expensive.

The so-called oil burners were being installed and taken out so rapidly that it was extremely difficult to keep in contact with customers. In as much as the so-called oil burner dealers continuously "passed the buck" in times of trouble in defending their installations to the quality of the oil, we were constantly meeting difficulties with our customers over payments for the fuel we had delivered to them.

Nevertheless, at the end of the first season, we felt that oil was a fuel to be reckoned with in the future, and we decided to increase our storage and delivery equipment. At the end of the first heating season we found ourselves confronted by another problem, and that was—what to do with the service men we had employed during the winter.

It seemed to us advisable to sell and install oil burners during the summer. However, we were frankly told by the oil burner dealers that if we did this, they would see that we did not sell oil on their future installations, and in as much as their installations would probably amount to many times more than ours, it seemed foolish to antagonize them and lose their cooperation. A few of these oil burner dealers had developed a fairly good sized organization—one company in particular had installed over 300 burners during the previous season,

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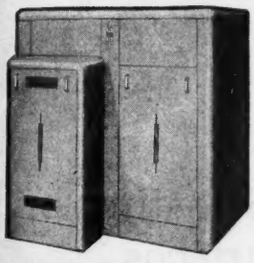

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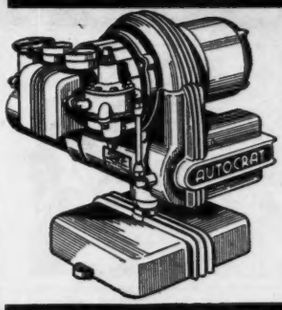

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Every THERMO-DRIP Humidifier has a *Monel metal* valve; when installed, it's isolated from the heat zone of the furnace. Rust and corrosion? Positively avoided with Monel! Liming-up and sticking? That can't happen, either! So, sell THERMO-DRIP—and keep *all* the profit.

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and they had recommended our oil on most of their installations.

After a great deal of thought and with some misgivings, we finally decided to go into the oil burner business; but we realized at that time if there were to be a future in the oil burning business, something better than the old Gravity oil burner would have to be sold and installed. Looking back on the development of oil burning in our market, we believe that our decision to enter this field, in spite of the opposition of all other burner dealers, was the most important decision we ever made in this business.

In choosing a burner to sell in our market we determined to get the best burner we could find, regardless of the price at which it must sell, and while our volume of oil burner sales during the first few years was not as large as we would have liked, we did sell a satisfactory number, and we learned to know our products, both burners and oil.

We feel that we built our business both in burners and oil on quality instead of price. With this background of satisfied users of good equipment, we have not been compelled to meet ruinous prices on either burners or oil.

To Prevent Sweating on Cold Surfaces

CONDENSATION on pipes and other metal surfaces may be prevented by covering them with a mixture of red lead and cork. After this protection is provided, final coats of paint may be used to obtain the desired decorative effect.

Red lead paste for this purpose is thinned only slightly so that it has nearly the consistency of paste. A mixture in the proportion of 100 lb. of paste red lead to ¾ gal. boiled linseed oil is about right. If raw oil is used instead of boiled oil, 1 pt. of drier should also be included. After the metal surface to be covered is thoroughly dried and wire brushed, the red lead is applied to a small area. Finely ground cork is then thrown against the wet paint or applied in other convenient ways. Other small areas are treated successively in this manner until the whole metal surface is covered.

After this first coat of red lead and cork has dried, two coats of white lead paint, tinted as desired, are brushed on. They should both be mixed in the proportion of 3 gal. raw linseed oil and 1 pt. drier to each 100 lb. of soft paste white lead. If the finish is to be dark, these last two coats may be red lead, tinted and mixed to ordinary brushing consistency.

—From "Lead," September, 1937.

Master Specifications

Home Owners' Loan Corporation, Appraisal-Reconditioning Division, Washington, D. C., has prepared a list of Master Specifications of construction for reconditioning under corporation supervision in the form of a booklet for the use of contractors employed by the Corporation, intended to insure the best standards of materials and workmanship. These specifications are applicable for general use. The contents covers roofing and sheet metal, weatherstripping, insulation, termite control, heating and miscellaneous steel, iron and other metals.

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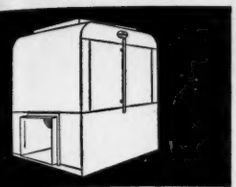

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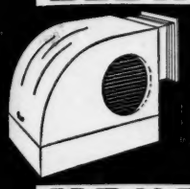

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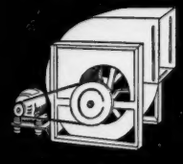

A reliable, practical unit combining humidity control, forced warm air circulation and filtered air. A unique dual system of control eliminates possibility of excess condensation.

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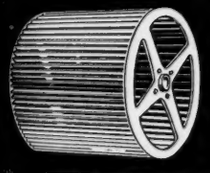

Sizes 10" diameter to 25"—with or without motors—top horizontal, bottom horizontal, top vertical and bottom vertical discharge openings.

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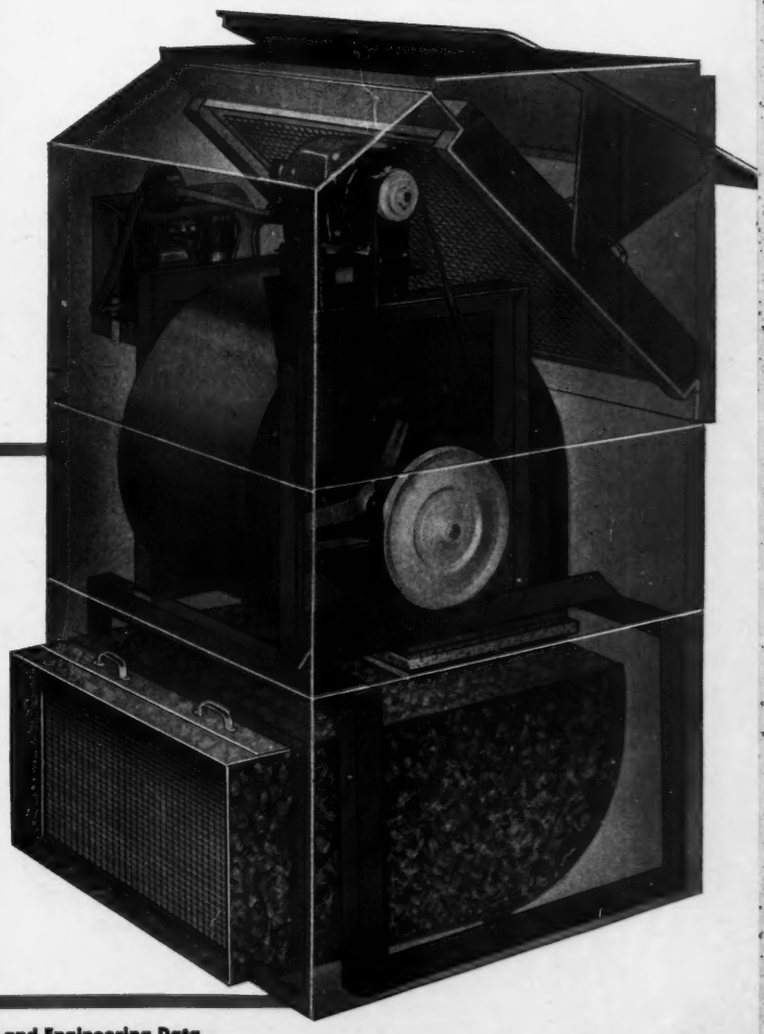

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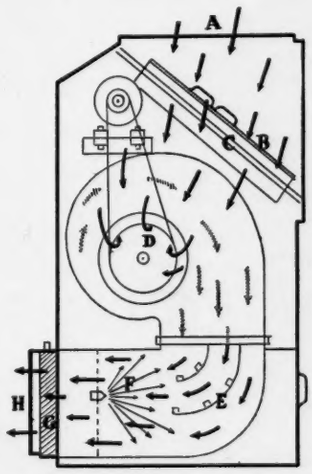

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This innovation in marking our product is just another instance of the modern and helpful service rendered by Lamneck. For systematic storing, handling, and installing, Lamneck Prefabricated Duct and Fittings, this labeling plan will prove of material aid to you and your organization. Because of its advertising value, it also should prove an invaluable sales promotion feature for you. To discriminating customers *labeled* products are *quality* products.

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PREFABRICATED DUCT AND FITTINGS FOR FORCED AIR AND AIR CONDITIONING SYSTEMS

The Fort Wayne Licensing Ordinance

Our publication of the Fort Wayne ordinance is nearing the end. This ordinance, like that of Minneapolis, is unusually complete and leaves little to guesswork, either for contractor or inspector. Readers wanting printed copies should write us.

Section 30. Furnace, Construction and Installation of: The construction and installation of all warm air furnaces hereafter installed in connection with mechancal warm air heating and air conditioning plants in the City of Fort Wayne shall, except as elsewhere in this ordinance otherwise provided comply with the following requirements:

a. Foundations and Other Supports for: Shall be as provided for in Sub-Section 25-b of this ordinance.

b. Setting or Assembling of: Shall be as provided for in Sub-Section 25-c of this ordinance.

c. Casings. Casings shall be constructed of galvanized iron, 26 gauge or heavier or they may be constructed of masonry. Galvanized iron casings shall be lined with black iron liners, extending from the grate level to the top of the furnace and spaced from one (1) inch to one and one-half (1½) inches from the outer casings. Casings for commercial or heavy duty furnaces, if built of galvanized iron, shall be insulated with fireproof insulating material at least two (2) inches thick. Casings may be either round or square. The hood or bonnet of the casings above the furnace shall be as high as practicable to form a plenum chamber over the top of the furnace.

Any furnace, the casing top of which shall come within twelve (12) inches of a combustible floor, ceiling or joist, shall be protected by a metal shield, extending not less than eighteen (18) inches beyond the casing of said furnace. Any furnace casing or top coming closer than six (6) inches of a combustible ceiling or joists shall be provided with at least one and one-half (1½) inches of magnesia or equivalent incombustible insulation in addition to the metal shield.

d. Baffling: All furnace casings shall be equipped with baffles so constructed and placed as to force impingement of air against the heating surfaces of the furnace, unless furnace body is so constructed as to provide this baffling effect.

e. Smoke Pipes: Smoke pipes shall be constructed and installed in accordance with the provisions of Sections 20 and 21 of this ordinance.

Section 31. Headers, When: Spacing of Studding and Joists: shall be as provided for in Section 26 paragraphs (a) and (b).

Section 32. Fans, Method of Selection: The following provisions shall govern the selection of a fan or blower for installation in any mechanical warm air heating or air conditioning system: Select a fan which, according to its manufacturer's certified rating, is capable of delivering a volume of air, expressed in cubic feet per minute (as determined in Section 27 of this ordinance) against a frictional resistance, expressed in inches of water, computed by adding together the following items:

(a) The frictional resistance of the warm air trunk or leader having the greatest resistance.

(b) The frictional resistance of the return air trunk or leader having the greatest resistance.

(c) The resistance to the flow of total volume of air through the furnace casing or hood, which shall be considered to be not less than from 0.10 to 0.15 inches of water, depending upon furnace and casing construction.

(d) The frictional resistance through any other accessories, such as washers, filters, etc.

(e) A factor of safety of ten (10) per cent of the resistance calculated above.

Section 33. Filters: Air filters shall be so installed as to be readily accessible for inspection and removal for cleaning or replacement. Duct connections to and from filters shall change size or shape gradually to insure even distribution of air over entire filter area. Filters installed close to outside air inlet shall be protected from the weather by suitable louvers in front of which a one (1) inch mesh wire screen shall be provided.

Section 34. Air Washers: The following provisions shall govern the design, construction and installation of air washers when incorporated as a part of any mechanical warm air heating or air conditioning system:

(a) Air shall be uniformly distributed over washer inlet.

(b) Spray nozzles shall be so spaced and arranged that spray will completely cover cross sectional area of washer above tank.

(c) Air velocity through washer shall not be less than 300 feet per minute nor greater than 600 feet per minute.

(d) Provision shall be made to prevent entrained moisture being carried past washer outlet.

(e) Drain and overflow connections from washer tank shall not be direct connected to sewer or waste line but shall in all cases drain to open receptacle.

(f) Fresh water connection shall be so arranged that there will be no possibility of tank water being drawn back into water supply line in the event of lack of pressure in supply lines.

Section 35. Controls: Mechanical warm air heating and air conditioning systems hereafter installed shall be equipped with automatic controls capable of performing at least the following minimum functions:

a. Oil Fired Furnaces: At least three thermostats shall be employed as follows: Thermostat No. 1 will stop the burner when the room temperature is too high and No. 2 will stop the burner when the temperature of the air in the plenum chamber or main duct exceeds the setting of thermostat No. 2. Both temperatures must be below their respective settings to start the burner. Thermostat No. 3 responds to the flame temperature and in conjunction with the control switch acts as a safety to stop the burner if the latter fails to ignite or burn properly as demanded by thermostats No. 1 and No. 2.

b. Gas Fired Furnaces: Shall employ thermostats No. 1 and No. 2 as for oil fired furnaces. Either a thermostatic pilot, so constructed and adjusted that no gas can flow through the main burner unless the pilot flame is burning.

or some other similar type of safety device serving this same end, shall be employed. The operation of the safety device shall not depend on the closing of an electric circuit to shut off the main gas supply. A gas pressure regulator shall be installed on all gas fired furnaces.

c. Stoker Fired Furnaces: Shall employ thermostats No. 1 and No. 2 as for oil fired furnaces.

Section 36. Noise Elimination: The fan or blower housing shall not be directly connected with metal, either to the furnace casing or to the return air piping. Canvas strips may be used in making these connections.

Motors shall be mounted in such manner that vibration will not be transmitted to duct work or equipment.

Electrical conduit and water piping shall not be fastened to, nor make contact with fan housing.

Section 37. Summer Air Cooling Equipment; Basis for Design of:

Cooling equipment installed in connection with a warm air all year air conditioning system shall have a cooling capacity not less than that determined in accordance with the following design requirements:

a. Outside Design Temperature and Relative Humidity: The design dry bulb and wet bulb shall be not cooler than 93 degrees F. dry bulb and 74 degrees F. wet bulb. Approximately 40 per cent relative humidity.

b. Inside Design Temperature and Relative Humidity: The assumed inside design temperature and relative humidity shall be not more than that set forth in the following table for the type of occupancy which may apply. Type "A" shall be for continuous occupancy. Type "B" shall be for approximately 3 hour occupancy. Type "C" shall be for occupancy of 1 hour or less.

Inside Design Temperatures

Occupancy	Dry Bulb	Wet Bulb	Relative Humidity	Effective Temperature
A	78° F.	67° F.	56%	73 ° F.
B	80° F.	68° F.	53%	74.5° F.
C	82° F.	69° F.	52%	75.5° F.

c. Cooling Load, How Determined: The design coefficients for heat transfer through walls, roofs and glass areas and for heat gains from people and appliances as contained in the latest edition of the American Society of Heating and Ventilating Engineers Guide shall be considered as prima facie the correct standard.

d. Infiltration and Air Leakage: In a cooling system so designed that a positive pressure is carried within the room or space to be cooled, the heat gain due to infiltration and air leakage may be omitted in design calculations.

Ventilation and Air Conditioning

Section 38. Definitions: For the purpose of this ordinance the following definition shall govern as to the meaning of the term and expression so defined, wherever said term and expression is employed in this ordinance.

a. Ventilation: The term ventilation shall be taken to mean the process of supplying or removing air by natural or mechanical means, to or from any space. Such air may or may not have been conditioned.

Section 39. Information for Checking: The plans and specifications of all air conditioning installations submitted for approval under this ordinance shall set forth the heat transmission coefficients for barriers and the amounts and sources of heat loss and gain. The design temperatures and relative humidity shall be recorded for air outside and inside, also for condensing air or water, and for the heat transferring medium.

These governing design factors and temperatures shall be such as to produce an effective result at least equal to those set forth in this ordinance.

Section 40-a. Design Coefficients for Heat Transfer Through Construction Barriers and for Heat Gains from People or Appliances: Design coefficients for heat transfer through construction barriers and for heat gains from people or appliances shall conform to the standards incorporated in Chapter 1 to 13 inclusive of this ordinance. The design inside relative humidity shall be 50% when the outside condition is 30 degrees F. and 40% Rh.

c. Outside Design Temperature and Relative Humidity in Summer: The design dry bulb and wet bulb temperature shall not be cooler than 93 degrees F. dry bulb and 74 degrees F. wet bulb respectively. Approximately 40% relative humidity.

d. Inside Design Temperature and Relative Humidity in Summer: Three classifications for inside conditions shall be recognized by this ordinance as follows:

Type A: In spaces which are occupied continuously for more than three hours or where exceptional cooling is desired, the assumed inside design temperature and relative humidity shall be not more than 78 degrees F. dry bulb and 67 degrees F. wet bulb. Approximately 56% Rh.

Type B: In spaces of normal occupancy or not more than three hours, the assumed inside design temperature and relative humidity shall be not more than 80 degrees F. dry bulb and 68 degrees F. wet bulb. Approximately 53% Rh. This classification will be standard for most installations.

Type C: In spaces where the occupancy is less than one hour or such installations where the design requirements are less exacting, the assumed inside design temperature and relative humidity shall be not more than 82 degrees F. dry bulb and 69 degrees F. wet bulb. Approximately 52% Rh.

e. Infiltration and Leakage: Design capacity to care for infiltration of air from outside shall be provided in all heating and cooling systems except that in a system so designed that a positive pressure is maintained within the room or space to be heated or cooled the heat loss or gain due to infiltration and air leakage may be omitted in design calculations.

The coefficients and data set forth in the latest edition of the American Society of Heating and Ventilating Engineers Guide shall be taken as prima facie correct for use in computing infiltration losses or gains.

f. Design Allowances for Heat Gain Due to Sunlight: The heat gain from sunlight varies from hour to hour on various exposures, and in order to get a correct total heat gain for any hour of the day its value on all surfaces exposed to sunlight must be added to the sum of all other heat gains occurring at the same hour. The highest total heat gain may occur at the time of highest conductance load, or at the time of highest occupancy load, or at the time of greatest sun effect on the largest exposed wall or glass areas. Final calculations shall be based on the hour giving the maximum total of all heat gains, taking into account the time lag factor due to heat capacity of the structure and the consequent time lag in the transmission of heat. The tables, curves, and data incorporated in the last edition of the American Society of Heating and Ventilating Engineers Guide shall be considered as prima facie correct and used as a guide for such calculations.

g. Design Allowance for Shading from Sunshine: Design allowance for shading from sunlight shall be made only when the plans and specifications specifically show such allowance, and give assurance that the owner is cognizant of the reduction in capacity on this account.

h. Design Air Quantity: (a) For winter air conditioning the design air quantity shall be not less than the requirements of this ordinance. In all cases a minimum air circulation of four (4) air changes per hour or twenty-five (25) cubic feet per minute per person, whichever is greatest, shall be provided.

(b) For summer air conditioning the design air quantity

(*Continued on page* 100)

Sheet Metal Distributors Annual

The forty-third annual convention of the National Association of Sheet Metal Distributors was held in Chicago, October 18, 19, 20 and 21. An excellent attendance was recorded, with representatives of wholesalers and manufacturers coming from all parts of the country to discuss problems of the day.

Terne

With President A. W. Howe presiding, the separate program of the distributors was held on October 19. Speaking on methods for increasing use of terne plate, A. R. Totten of Carnegie-Illinois Steel Company said that terne plate is not a new product and that its qualities have always made it a preferred material, but lower priced materials have undercut the original market. The Carnegie-Illinois company, for one, are this year attempting to broaden the market by advertising to architects and builders and suggested that wholesalers and contractors cooperate by talking up the merits of terne wherever possible.

O. F. Murphey, Lyon, Conklin & Co., chairman of the Tin and Terne Plate Committee, reported that the committee on terne plate appointed at the May meeting to secure cooperation of the Department of Commerce in getting all sheets marked as to size, pack, weight of coating had been successful and simplified practice ruling R30-37 becomes effective in November.

1937, according to Mr. Murphey, has seen a 23 per cent increase over 1936 in the sale of terne plate. As a serious problem, the speaker reported that 50 per cent of the trade reports competition from mills selling direct to the buyer.

Distribution

In the absence of F. R. Meyer, Jr., Inland Steel Company, Secretary Fernley read his paper on distribution of sheets. Mr. Meyer reported that in 1936 approximately 1,500,000 tons of flat and corrugated sheets had been sold at about 70 dollars per ton. This is a market well worth cultivating, said the speaker. The most serious problem today, according to Mr. Meyer, is the invasion of the sales field of the jobber by the mill selling direct. In 1936 approximately 536,000 tons of sheets were sold direct by the mills.

Mr. Meyer pointed out that this problem has been before the industry for many years and little if any progress has been made toward a satisfactory solution. As a tentative suggestion, the speaker declared he favored an agreement whereby all carload orders or greater should automatically go from the mill direct. All less than carload orders to be sold, billed, delivered by the jobber. The problem is further complicated by jobbers who dislike to carry large stocks of sheets and prefer to have the mills carry the stock, yet the jobbers expect to earn a discount profit when the large order is handled by the mill, but sold by the jobber.

Discounts

The report of the black sheet, corrugated and roofing committee read by Chairman A. J. Becker, included suggestions that the present list of discounts and extras should remain in force as this list is satisfactory. The committee reported that some members would like to trade the present $2.00 discount per ton for materials sold for stock for better (larger) quantity differentials now included in the extras. Also that some local groups prefer the present structure as increased quantity differentials may lead to jobber overstocking in attempts to get lower prices with subsequent distress material dumped on the market.

In open discussion, a motion was made by F. O. Schoedinger that mills shall continue to pay the discount on materials bought for stock and present quantity differentials and also that these commissions shall be paid on all orders whether for stock or special order and on all sizes of orders according to the discount schedule. Voted unanimously.

The joint meeting of hardware manufacturers, dealers and sheet metal distributors were addressed by Wright Patman, congressman from Texas and co-author of the Robinson-Patman bill. Mr. Patman pointed out the changes in methods of doing business today, the inter-relationship between buying groups and declared that unless all income groups prosper and are able to buy the other groups will suffer.

Robinson-Patman Act

For example, the 30 million farmers, 40 million wage earners, 18 million distributors or retail merchants, the 7 million professional men are all dependent upon the others for good times. If farm prices are depressed the farmer cannot buy and the other three groups feel a slackening in business. The aim of all present day legislation, according to Mr. Patman, is to raise and hold incomes of each group so that prosperity will be general.

Mr. Patman declared that in his judgment everyone today is in favor of fair prices and profits for each group, Even the housewife will buy at higher prices if her income in turn is adequate. Polls show a preference for independent stores over chain stores, according to the speaker.

Taking an actual hardware order with items gathered together from many sources of manufacture, Mr. Patman explained that the collected order could not economically be handled by anyone but a jobber and that there undeniably is a place in our distribution system for the jobber.

Mr. Patman said that 50 years ago the Interstate Commerce Commission had great difficulty eliminating special rebates by railroads, but today we do not shop around for freight rates. So, likewise, it will take time for the fair trade practices of the Robinson-Patman act to secure public recognition and acceptance, but this will come. This bill, said Mr. Patman, is designed to remove many present day unfair practices, but does not aim to put anyone out of business if he plays fair.

Tydings-Miller Bill

The procedure is simple. If you have a complaint you write a letter to the Federal Trade Commission setting forth completely the complaint. F.T.C. sends an investigator who gets the other side of the story. If your complaint is justified a hearing is made and a ruling handed down. The Tydings-Miller bill is the enabling act which makes it possible for individual states to pass state laws controlling fair trade practices.

Mr. Patman suggested that business men watch cooperative movements. Cooperatives are legal and offer no harm—except as a cooperative is granted tax exemptions and other political favors. When not granted such favors it costs the co-op about as much to do business as it does our regular distribution system.

Distinctly startling to the audience was Mr. Patman's assertion that he has a bill ready for the January session incorporating an amendment to the Clayton Act making it unlawful for any chain organization to operate outlets in any state except the state in which the organization is incorporated. There will be regulations to prevent any such breakup as the large oil companies with interlocking directorates, and so forth.

Coming Conventions

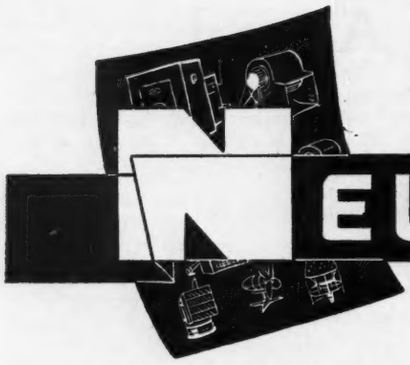
1937

Nov. 19—Sheet Metal & Warm Air Heating Contractors' Assn. of Indiana, District Meeting, Bedford, Indiana. Gov. Louis Heitger in the chair.

1938

Jan. 24-26—National Warm Air Heating and Air Conditioning Association. Winter Convention. Roosevelt Hotel, New York City.

Feb. 7-9—Master Sheet Metal, Heating, Ventilating and Air Conditioning Contractors Association, Inc. of Wisconsin. 24th Annual. Republican Hotel, Milwaukee. Paul L. Biersach, secretary.



For your convenience a number has been assigned each item. Check the items in which you are interested on the coupon on page 112 and mail to us. Complete information will be forwarded.

● **Indicates product not listed in 1937 Directory.**

△ **Indicates product and manufacturer not listed in 1937 Directory**

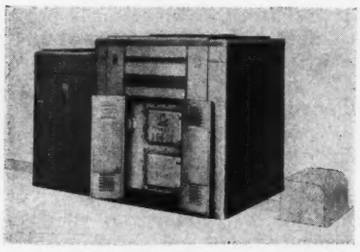
NEW PRODUCTS

● 171—Stoker Fired Unit

The Fox Furnace Company, Elyria, O., announces an air conditioning unit designed for stoker firing exclusively.

Either hopper or bin feed type of stoker can be installed from front. rear, either side, or below base of unit through openings provided in the heating element and cabinet. Around the openings in the heating element, steel Chutes are welded.

An outstanding feature of this new unit is the large double radiator. This radiator almost encircles the drum and has two complete, unrestricted fire travel passages. Fly ash can accumulate to approximately half the height



of the radiator without reducing the rated heating capacity of the unit. When cleaning is required, it is done through two cleanout collars conveniently located at the front of the radiator.

The cabinet is of modern design and is finished in two-tone green enamel. Corners are rounded; front castings are concealed by two access doors in the cabinet.

This Series "S" is made in two sizes. The 24 in. size has a capacity at register of 150,000 Btu. at a combustion rate of 17½ pounds of coal per hour. The capacity of the 27 in. size is 200,000 Btu. with 23½ pound combustion rate.

◆

172—Sweating of Air Ducts

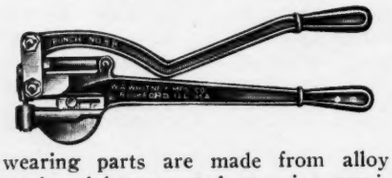
Armstrong Cork Products Company, Lancaster, Pa., announces a new form of Armstrong's Corkboard, especially designed for the insulation of ducts. DI Corkboard has, they say, the advantages of corkboard's great efficiency, high resistance to moisture and light weight. It is flexible, thus making it easy to shape to the sharp curvatures encountered in duct work. The insulation can be cut with a sharp knife and applied quickly. It is factory coated on one face with a waterproof mastic finish which adds strength and protects against moisture and air infiltration.

◆

173—Hand Lever Punch

The W. A. Whitney Mfg. Co., 636 Race Street, Rockford, Illinois, has placed on the market a new hand operated lever punch to be known as the No. 8B.

The new tool has three major parts, all drop forged and heat treated. All



wearing parts are made from alloy steel and heat treated, assuring maximum strength and minimum weight. The single roller bearing design develops extraordinary power and assures positive stripping which is done within an arc of 90 deg.

An especially handy feature is the adjustable gauge to regulate the depth of hole from the edge of the sheet.

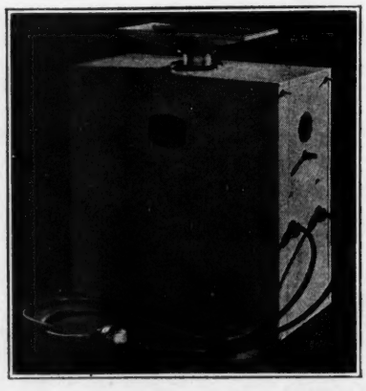
◆

△ 174—Electro Humidaire

Electro Heater Manufacturing Co., Duluth, Minnesota, announces the Electro Humidaire, with no moving parts, and which will empty from 10 to 24 gallons of water into the air each day. Henry A. Olin is the inventor.

Water from the domestic hot water supply is piped into the humidifier and heated to about 185 deg. F.

A float valve controls the water in the humidifier, maintaining a constant



supply—without hand filling. The water is heated by two methods, depending on the type of heating plant. In hot water or warm air heated homes an electrical element is used. A three-heat switch on the main floor controls the amount of humidity supplied. In steam heated homes, steam is piped into an indirect steam heater, controlled by a hand set valve.

◆

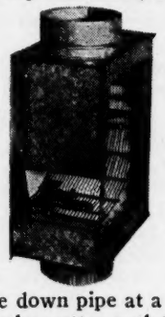
● 175—Thermostat Control Wire

The York Wire Section, Appliance and Merchandise Department, General Electric Company, Bridgeport, Connecticut, announces Deltabeston asbestos insulated thermostat control wire —fire-resisting, vermin and rodent proof. A rust-proof cadmium-plated armor is wound around the conductors, providing a complete protection against wear and abuses in usage. The armor is easily removed for establishing contacts. The wire is flexible, of small diameter and compact. It is furnished in two-, three-, or four-conductors, each identified by a distinctive color.

◆

△ 176—Rainwater Strainer

U. S. Cistern Filter Mfg. Co., Bloomington, Illinois, announces the O. K. Conductor Pipe Strainer, intended to



join into the down pipe at a convenient place below the gutter outlet and above the cut off. In use, it strains from the flowing water the decaying substance —straw, leaves, bugs, etc.—which is discharged through an opening.

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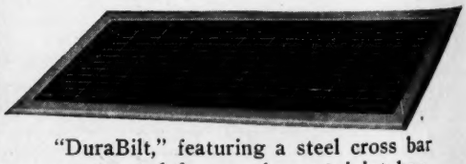
177—Interlocking Face Registers

Auer Register Co., 3608 Payne Ave., Cleveland, Ohio, has a new design of floor registers and cold air faces called



"DuraBilt," featuring a steel cross bar constructed face, each cross-joint having a mortised and locked fit. Each cross-member is also locked to frame by a hooked joint. The oblong mesh is well proportioned and creates an effect pleasing to the eye. Air capacity is generous, yet meshes are close enough to exclude French heels and small objects

You have the men... the experience... the tools *to install this* "Lifetime" Roof

Profitable business for the contractor who offers Anaconda ECONOMY Copper Roofing

Into better homes throughout the country, we're pouring messages about the modern, light-weight, moderate cost copper roofing developed by Anaconda.

This advertising opens the way for profitable contracts for you. Let your community know you offer this better roofing.

Anaconda ECONOMY Copper Roofing weighs 10 oz. per square foot. Narrower sheets (13¾ inches between standing seams) make it ideal for residential use. It is packed flat in crates containing sufficient copper (48 sheets) for 3 squares of roof area. Strips are 16 inches wide and 6 feet long. Complete information will be sent you on request. Write today!

Here's what sells this new-type copper roofing

- it's genuine Anaconda Copper, yet moderate in cost.
- its appearance actually improves with age and service.
- it is durable through the years . . . time-proof and weather resistant.
- it is fire-safe . . . copper protects the home from flying sparks.
- it is water-tight . . . protects cellular insulation from loss of efficiency due to moisture. 37233

ANACONDA from mine to consumer

Anaconda Copper

THE AMERICAN BRASS COMPANY · GENERAL OFFICES: WATERBURY, CONNECTICUT

Offices and Agencies in Principal Cities · In Canada: ANACONDA AMERICAN BRASS LTD., New Toronto, Ontario

New Products . . . . . .

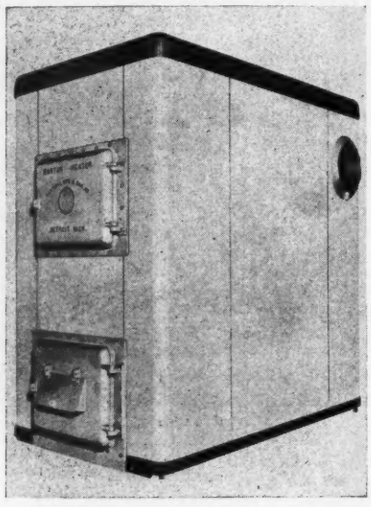
● 178—Anti-Pulsator

George Evans Corporation, Moline, Illinois, announces Anti-Pulsator, a new pulsation eliminator, added to Evans fuel oil furnaces. Patents have been applied for. "No burner," they say, "can pulsate in an Evans furnace."

◆

△ 179—The Barton System

The National Manufacturing and Engineering Co., 628 E. Forest, Detroit, Michigan, has started production on forced air heating, ventilating, and



air conditioning units, to be manufactured for distributors under their own trade names as well as under the "Barton" trade mark for coal, oil, gas, and stoker firing.

◆

△ 180—Spilpruf Valve

American Injector Company, designers, 1481 Fourteenth Avenue, Detroit, has developed a simple or ingenious device assembled from zinc alloy die castings to avoid spillage of oil on customer's lawns and driveways, the necessity of entering the customer's basement to make delivery, and the fuss and commotion attending mid-day visits of a tank car. In addition, the unit is purported to save oil companies as much as 20 per cent in domestic distribution expenses.

The unit attaches at the inlet to the customer's storage tank and automatically closes a butterfly valve when the oil level has risen sufficiently to lift the hollow float. As soon as this valve closes, a back-pressure is communicated back through the line to the delivery truck where a check valve stops oil delivery. The oil then remaining in the line between the delivery truck meter and the storage tank, drains slowly past the butterfly to give the user a full measure of fuel without danger of spillage.

181—Protectorelay

The Minneapolis-Honeywell Regulator Company, Minneapolis, Minn., has developed and released the Type R157A Protectorelay—an industrial oil burner control system. This Protectorelay permits predetermined ignition timing, delayed opening of the oil valve, if required, and timed scavenger or recycling period. It incorporates the basic "Series 10" circuit using one line voltage and one low voltage relay. One time switch is utilized for both ignition and oil valve as well as providing a timed delayed return to the cold position. The Type R157A Protectorelay is offered for use with the Type C56 Pyrostat, mounted in the stack or breeching, to provide safe operation of the burner. This three-wire Minneapolis-Honeywell safety control overlaps on the heating cycle but not on the cooling cycle.

The Type R157A Protectorelay is finished in black Kristo Krak and is approximately 7½ in. high and 7⅞ in. wide.

◆

● 182—Combustion Chamber

Scott-Newcomb, Inc., Saint Louis, Missouri, has added the S-N Moulded Firebrick Combustion Chamber for oil burner installations. These combustion chambers are made of high grade refractory material and because

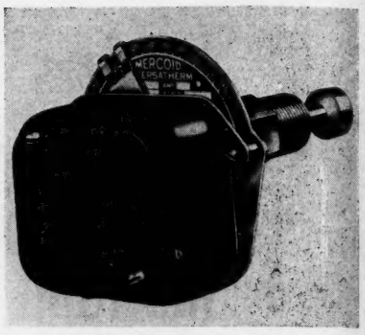
of their scientific and unique design are said to insure efficient combustion. Installation is easy, as no joint material is required and they can be readily formed to round, square, or rectangular shapes without cutting or fitting.

A standard package consists of one front tile and fourteen body tile.

◆

183—New A. C. Unit

Robeson Engineering Co., Inc., 290 Sanford St., East Orange, N. J., announces a new low-priced air conditioning unit. A 4-page folder with illustrations and brief description is available.



● 184—Immersatherm

The Mercoid Corporation, 4201 Belmont Avenue, Chicago, introduces the Immersatherm—a new low priced year-round hot water control. It is used with steam, vapor and hot water systems employing indirect hot water heaters.

The small size of this control permits it to be installed in locations crowded for space. The two wire system also simplifies the installation.

The sealed mercury switch used in this control remains in a stationary position. It operates by means of a small permanent magnet that is actuated by a very small bimetal coil inclosed in a copper shell housing, through which the water temperature is rapidly transferred.

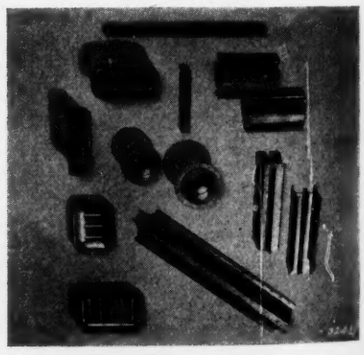
The mercury switch insures a perfect electrical contact at all times. It cannot be affected by dust, dirt or corrosion.

◆

● 185—Zincgrip

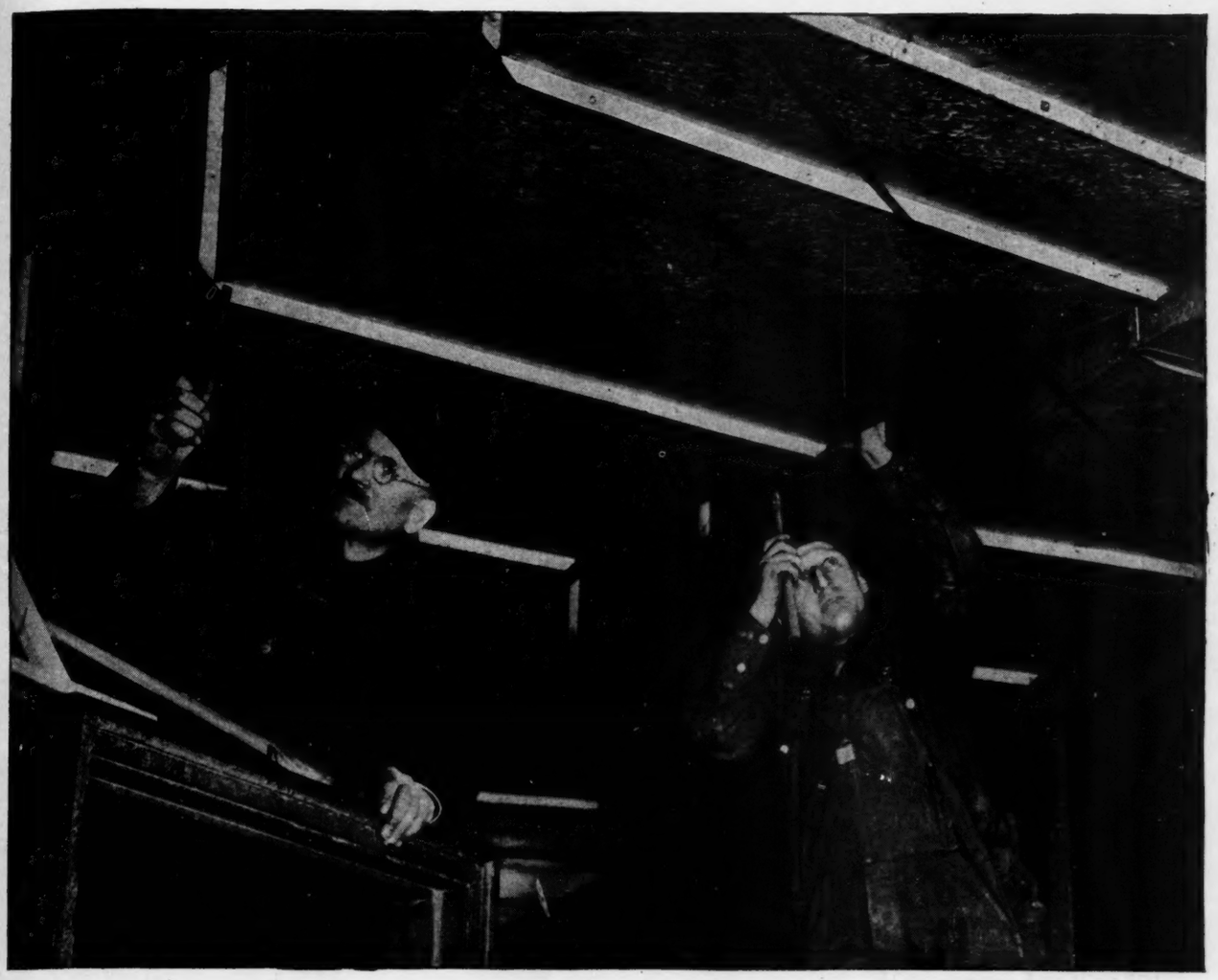
The American Rolling Mill Company, Middletown, Ohio—Armco research has perfected a revolutionary type of galvanized sheet with a heavy coating of commercially-pure zinc that will not crack or peel when it is subjected to relatively severe drawing or forming operations, according to an announcement by W. W. Sebald, vice-president.

The new material, produced in both sheets and coils, is known as "Zincgrip." It carries from 50 to 75 per cent



more protective zinc than tight coat sheets generally used for fabricated products.

Up to now, hot dipped zinc-coated coils in sheet width have not been produced. Armco Zincgrip, from 16 to 28-gauge, is made available in any of the basic grades of galvanized iron or steel sheets and strip manufactured.



Sheets that promote good workmanship

BETHLEHEM GALVANIZED SHEETS have a soft, ductile base—the kind that invites a sheet-metal worker to show what he really can do. No cracking of the metal—no hard spots that might cause uneven seaming. The sheets are flat; they are accurately sheared, uniformly coated; they give full weight. The finished job will be neat and will last. Important also, it will move through your shops faster and with less effort.

And the fine appearance of Bethlehem Galvanized Sheets adds to any job. The bright, large spangles of the galvanizing, the tightly adhering coat of good, clean zinc that doesn't flake with the sharpest forming and seaming, provide the basis for the kind of a job that brings more business.

BETHLEHEM STEEL COMPANY, *General Offices:* Bethlehem, Pa. *District Offices:* Albany, Atlanta, Baltimore, Boston, Bridgeport, Buffalo, Chicago, Cincinnati, Cleveland, Columbus, Dallas, Detroit, Hartford, Honolulu, Houston, Indianapolis, Johnstown, Pa., Kansas City, Mo., Los Angeles, Milwaukee, Nashville, New York, Philadelphia, Pittsburgh, Portland, Ore., St. Louis, St. Paul, Salt Lake City, San Antonio, San Francisco, Savannah, Seattle, Syracuse, Toledo, Tulsa, Washington, Wilkes-Barre, York.
Export Distributor: Bethlehem Steel Export Corporation, New York.

BETHLEHEM STEEL COMPANY

BETHLEHEM STEEL

New Products . . . . . .

• 186—Packaged Unit

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pennsylvania, is entering the home air conditioning market, according to P. Y. Danley, Manager Refrigeration and Air Conditioning Department with a packaged unit.

According to Danley's announcement, Westinghouse will concentrate on the market comprising new homes costing from $5,000 up. The new Westinghouse "packaged" unit employs a central system of matched units comprising a direct-fired forced warm air furnace, with filters, blower, and humidifier for winter conditioning and the Westinghouse Seal-less condensing unit and cooling coil for summer conditioning, at a moderate cost. This complete system for summer and winter air conditioning comes "all in a single package."

Gas-fired furnaces are available in capacities from 100,000 to 270,000 Btu with matched equipment for summer conditioning. Smaller units of similar design ranging from 60,000 to 100,000 Btu will be available before 1938.

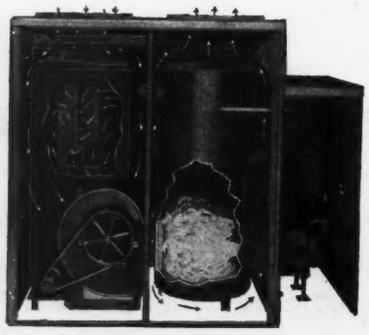
Oil-fired furnaces are available in capacities from 100,000 to 190,000 Btu and before 1938 smaller units ranging from 50,000 to 100,000 Btu will also be available.

The conditioning units have been styled in a special tan with brown trim.

◆

187—"Oil-Economy 125"

International Heater Company, Utica, N. Y., announces "Oil-Economy 125," designed for the small and mod-



erate sized home—a compact, low priced, attractive winter air conditioning unit exclusively for oil.

Being 36 in. wide, 75 in. long, and 60 in. high, it requires a minimum of space. The outer 20-gauge cabinet finished in two tone green enamel and lined with galvanized iron affords an attractive appearance and fully conceals the burner and controls.

The unit is also available at a definitely lower price with a galvanized iron jacket having no burner enclosure, replacing the 20-gauge enameled cabinet. Where exposure of burner and controls is not objectionable this galvanized housing is just as satisfactory.

All International Heaters may be sold on a deferred payment plan which is without recourse.

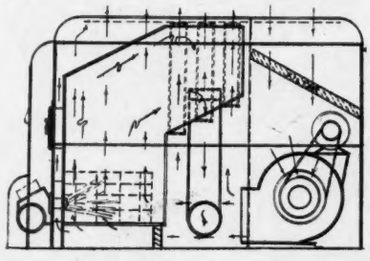
◆

△ 188—Bertossa Power Heater

The Bertossa Power Heater Division, Jackson and Church, Saginaw, Michigan, announces the new Bertossa power heater, ranging from 50,000 to 2,800,000 Btu.

This furnace features the "Superheater" heat tube chamber providing revolutionary heat transfer and air acceleration characteristics.

Full vestibule is supplied for oil or gas burners, or as a half door for sto-



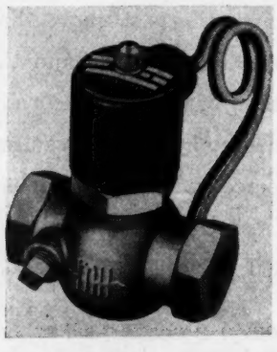
ker. There is a full pressure type blower with belted motor matched to furnace and type of firing. Permanent air filters of special material can be cleaned by home owner. The unit is equipped with complete controls.

The casing is streamlined, furnished in apple green with attractive trim—fabricated in panels of double construction with ¾-inch air space insulator, assembled in a few minutes with a screwdriver.

◆

189—Magnetic Gas Valve

The Minneapolis-Honeywell Regulator Company, Minneapolis, Minnesota, has just announced to the gas industry a new magnetic gas valve of the silent solenoid type designed particularly for applications where quietness, ease of installation and freedom of service are required. Minneapolis-



Honeywell, however, has retained the 1 in. and 1¼ in. size valves of the old design for these particular applications while the new Types V435 and V835 will be offered in ⅜, ½ and ¾ in. sizes. These two-wire valves are also included in the new gas regulator packages simultaneously introduced along with the new type magnetic gas valves. These packages, known as Y77, Y78, Y79, were designed primarily for floor furnaces and circulating heaters.

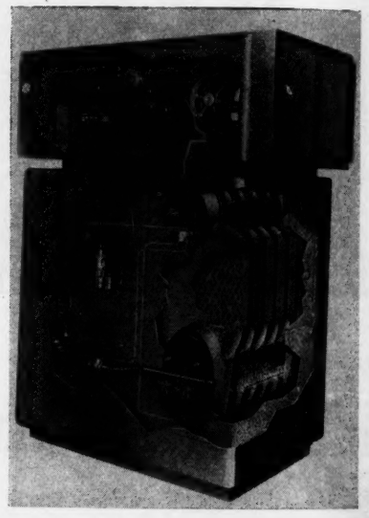
The new valves are furnished only in straight through pattern with screwed ends. All standard models are offered at 110 volts, 50 and 60 cycles.

◆

• 190—Gas Fired Conditioner

American Gas Products Co., 40 West 40th Street, New York City, announces the new AGP gas fired air conditioner, Type 2-FE, which heats, humidifies, filters and circulates air. It is designed on an entirely new principle, built from the ground up to be a completely automatic direct-fired winter air conditioning unit.

One of the important elements introduced into its design is the "counter-flow principle." The fan unit, mounted on top, blows air down over the heating surfaces in counter flow to the upward passage of the products of combustion on the other side of this heating surface. The counter flow principle of heat transfer increases, to a maximum, the rate of transfer of



heat from metal to air, and reduces the weight and size of the heating sections.

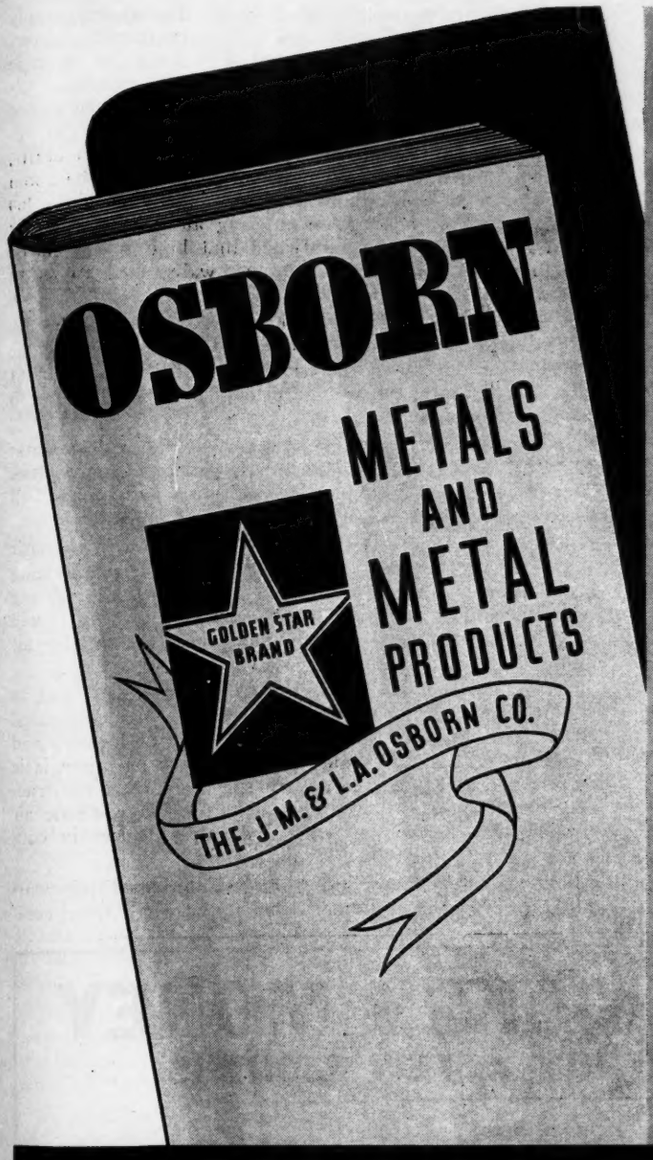
Safety is provided by AGP controls, concealed within the casing. Beauty is given by simple, modern lines and smooth lustrous baked enamel finish of gun metal grey.

◆

191—Damper Regulator Sets

Hart & Cooley Manufacturing Co. of Chicago announce their No. 80 line of damper regulator sets. These sets are furnished with disk-type regulators. The ¼ in. set has the No. 53¼ "Snap" bearing, which permits even the smallest dampers to be installed without bending. The ⅜ in. set, Class No. 80⅜, for large dampers, has bearings with solid shank. All bearings are steel. All parts are Cadmium plated.

The No. 80 line of damper regulator sets does not replace, but is supplementary to the No. 50¼ and No. 50⅜ sets.



WHERE TO BUY IT?

This New Stock List has the Answer for you

The sheet metal shop that is "going places" today has calls for many items which were little known a few years ago. New metals with almost countless applications in homes and factories, winter air conditioning, ventilating, roofing, etc., each presents its own individual problems. Not the least of these is a prompt, dependable source of supply.

Where to buy—and buy with confidence—the many and varied products you require? You'll find the answer in the new No. 37 OSBORN Stock List. This conveniently arranged 210 page catalog contains the needed information on practically every material, equipment, fitting and supply, as well as all of the machinery and tools which a sheet metal man uses. That is what makes it an invaluable reference book to him. If you do not have one, and operate in the territory which we serve, we will be glad to see that you get a copy.

THE J. M. & L. A.
OSBORN Co
Manufacturers—Distributors
BUFFALO—CLEVELAND—DETROIT
Metals and Metal Products

A DEPENDABLE SOURCE OF SUPPLY FOR 79 YEARS

Fort Wayne Code

(*Continued from page 92*)

shall be sufficient to extract the surplus heat at the air inlet and outlet temperature specified and in addition shall be not less than the minimum requirements specified for winter air conditioning above.

i. Recirculation and Air from Outside: Provision may be made in the duct design for recirculation of air. Provided, however, that in such rooms where the occupancy by people is the governing factor not less than ten (10) cubic feet of air per minute per person shall be introduced from the outside.

The inlets and ducts shall have sufficient capacity to permit the introduction of as much as 100% of air from outside during the period of intermediate outside temperature subject to the approval of the Inspector.

Section 41-a. Diffusion of Entering Air: The location, shape, physical characteristics of, and air velocities and temperatures through the inlets and outlets for conditioned air to the rooms shall be such as will promote distribution of the circulation throughout all occupied portions without causing discomfort.

b. Downward discharging air inlets in rooms shall be provided with safeguards to prevent drafts at the occupied zone. These safeguards shall include plaques, injector type grilles, or other devices which shall discharge the air at an angle to the vertical and which will prevent air colder than the room air from falling vertically downward at speeds capable of causing discomfort. Unless such safeguards shall be provided, the design entering air temperature from inlets discharging vertically downward shall be not more than 5 degrees colder than the room air at the approximate level of the inlet.

c. The difference in temperature between the entering air and the room air for horizontally discharging supply openings in side walls of rooms with conventional registers when cooling shall never exceed 2 degrees per foot in height from the floor to the bottom of the opening.

Horizontally discharging air inlets in rooms when placed higher than head level shall be designed for sufficient velocity of discharge to bring about diffusion without drafts, especially when the entering air is cooler than the room air. The minimum design air inlet velocity shall be 100 linear feet per minute. The entering air velocity may be rapid for such openings, provided that high speed jets or air do not rebound from columns, walls, etc., so as to create discomfort to people.

d. Upward discharging air inlets in rooms shall be designed with arrangements, especially when delivering air cooler than the air in the room, so that a velocity of at least 300 linear feet per minute may be obtained so as to promote diffusion.

Section 42. Refrigerating Apparatus and Refrigerants: All refrigerants, cooling equipment, piping and specialties installed and used in connection with air conditioning shall be subject to the approval of the Inspector.

Section 43. Duct Design and Construction, Fans, Air Washers, Air Cleaning Devices, etc.: In all air conditioning installations the metals used shall be of moisture resisting character and of such weight and with such bracing as will prevent vibration. The ducts shall be substantially air tight.

Section 28 and its Sub-Sections, Sections 32, 33 and 34 of this ordinance, together with the standards incorporated in the last edition of the American Society of Heating and Ventilating Engineers Guide shall be taken as prima facie correct and as a guide to govern the design and construction of all duct systems, fans, blowers, air washers, air cleaning devices, cooling coils and other devices in connection with all air conditioning systems.

Section 44-a. Humidifying and Filtering Equipment: All convectors where condensation might occur when cool-

ing shall have drain pans with tubing running to drip with an air break above a trapped sewer connection or its equivalent.

b. No fixed spray humidifier or spray dehumidifier shall be installed above the basement of a building unless there shall have been installed under it a water tight safing graded to a drain, so that in case of leakage or overflow there shall be no danger of water damage to the rooms under the apparatus.

Section 45-a. Noise Control: All moving apparatus used in air conditioning shall be fastened securely to its own foundation, which should be a single unit for both driver and driven apparatus, and this foundation shall be carried on a noise inert substance such as rubber in shear, or cork under and around the edges of the foundation, without any direct contact between the foundation and the building structure.

b. No metal duct shall connect directly to any fan or housing without a sound-inert junction, such as of canvas.

c. Piping connections from pumps where practicable shall be made with a rubber hose, with the machinery on a floating foundation.

d. Sharp edges of metal facing an air current shall be rounded or streamlined rather than left sharp and rough. Partitions, housing, and large ducts must be so heavy and well braced that there will be no vibrating or rattling when air is being delivered.

e. On account of noise danger the following air velocities shall not be exceeded in those parts of the ducts of air conditioning systems closer than about 50 feet from the room outlets.

Fan outlet 1,500 linear feet per minute; Trunk duct 1,200 lineal feet per minute; Through free area of convectors 1,000 linear feet per minute.

f. Where fans, motors, compressors, and the like are placed in rooms under or otherwise adjacent to occupied rooms, provision shall always be made to reduce noise transmission. Suggested means are double walls, double ceilings, sound absorbent material and the like.

Section 46-a. Insulation: Insulation on pipes and air-ways when heating, is designed to reduce transmission to the surrounding air, and is under no danger of becoming moist except in case of a liquid leak.

b. Insulation on pipes and air-ways when cooling, in addition to reducing heat transfer from the surrounding air to the cooler substance inside, must prevent the surrounding air from reaching its dewpoint and thus depositing moisture. The dewpoint temperatures for conditions of the air around a cool duct or pipe may be read from a psychrometric chart.

c. For ducts carrying air not colder than 40 degrees F. a ½ inch layer of board or quilt insulation will serve, provided that the chilled areas are all covered so that air does not pass against the cold surface. For housing around evaporators and for spray dehumidifier housings ½ inch of quilt insulation and ½ inch of board insulation with alternating joints and thorough sealing, have given satisfactory service. Cork 1 inch thick properly sealed gives satisfactory results, especially for spray dehumidifier housings which carry direct expansion evaporators also.

d. For low side refrigerant piping cork insulation is acceptable, of thickness commensurate with the temperate difference.

e. For systems which use cold water piped to the convectors for summer only, any anti sweat pipe insulation 1 inch thick is acceptable. Where the same pipes convey hot water in winter and cold water in summer, a combination insulation shall be used, which will withstand both extremes. Compressed mineral wool has this faculty, though there is evidence that any good quality steam pipe insulation will serve satisfactorily provided that there are no exposed chilled surfaces to condense the damaging dew.

[To be continued]

Association Activities . .

NWAH&ACA

At the Winter and Annual meeting of the National Warm Air Heating and Air Conditioning Association to be held at the Roosevelt Hotel, New York City, on January 24, 25 and 26, the association will celebrate the 20th anniversary of their research activity carried on in co-operation with the University of Illinois.

At the same time will be the Fifth Biennial Air Conditioning Exhibition in the Grand Central Palace, New York City, and the Winter session of the American Society of Heating and Ventilating Engineers.

The demand for the Technical Forced Air Code continues and the new Data sheets are becoming more popular.

Allen W. Williams,
Managing Director.

◆

Chicago

The Furnace and Sheet Metal Institute of Chicago held a meeting Friday night, October 15th, at 2051 Belmont Avenue. Plans were discussed for a Ladies Night to be held November 27th and John Novak, the tireless worker, was put in charge of arrangements.

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Minneapolis

The Minneapolis Warm Air Heating and Air Conditioning Association has been formed by approximately twenty firms doing about eighty-five percent of the warm air heating and air conditioning business in Minneapolis and vicinity in the residential and small business field.

A survey of the cost of doing business is now being made by the association among its members with the view to adopting a more uniform plan of selling. The organization plans to meet and deal with common problems. Price cutting and the so-called "chiseling" in the industry is one of the problems to contend with and to some extent the association will endeavor to police the industry and check these evils. In March of this year Minnesota passed an Unfair Trade Practice act, which is felt to be favorable to this industry.

The members of the association, under the City ordinances of Minneapolis, are required to be licensed to install their equipment and permits must be taken out for each particular job through the office of the Building Inspector. One of the activities of the association is to prosecute and stop any violations of these ordinances.

Officers of the association are: J. E. Waldron, president; H. K. Johnson, vice president; Walter C. Kuehn, secretary; and Jack Kopp, treasurer. The executive secretary is Arthur H. Hallgrain.

Arthur G. Hallgrain,
Executive Secretary.

◆

Wisconsin

The 24th annual convention of the Master Sheet Metal, Heating, Ventilating and Air Conditioning Contractors Association, Inc. of Wisconsin is to be held on February 7, 8 and 9, 1938, at the Republican Hotel, Milwaukee.

The following Convention Committee was appointed at a recent Board of Directors meeting:

Walter Arndt, Paul L. Biersach and A. C. Goethel of Milwaukee; William Gehrke of Sheboygan; J. B. Wallig of Kenosha; William Hielscher of Racine; C. F. Warning of Oshkosh; W. Schields of Wausau; C. F. Goldstone of Menominee, Michigan; Palmer Hanson and B. Zahn of LaCrosse; Otto Ziebarth and Louis Hirsig of Madison; R. F. Gehrke, President of Shawano.

Paul L. Biersach,
Secretary.

◆

Chicago

The Master Sheet Metal Association of Chicago's South Side held their bi-monthly meeting Monday night, October 18th. The meeting was presided over by President Kirby and several lively discussions took place on various phases of the sheet metal workers' business.

—News Briefs—

Second Avenue North, one of the principal wholesale streets of Nashville, Tennessee, is being widened fifteen feet—Broadway to Church—and stores on the west side are having new fronts and floor changes. The property owners and the city share in the expense.

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New Incorporations

The Northwestern Heating Service has incorporated its business at 8621 Fenkell Avenue, Detroit, Mich., with a capital stock of 1,500 shares.

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John and Arvi J. Anderson have engaged in the plumbing, heating and sheet metal business at 232 Taylor Avenue, Astoria, Ore., under the style of John Anderson & Son.

◆

Herman Bauer and Conrad Bayer have engaged in the sheet metal business at 880 Terrace street, Muskegon, Mich.

◆

The Broadway Sheet Metal Works has engaged in business at 1444 Lincoln Boulevard, Santa Monica, Cal., under the management of Clifford O. Williams.

◆

The Wilson Sheet Metal Works has engaged in business in Bakersfield, Cal.

◆

The Cooper Sheet Metal Works has been established at 7607 S. Broadway, Los Angeles, Cal., by Charles Cooper and William Cooper.

◆

The Tait Engineering Co., 2926 Rockefeller avenue, Everett, Wash., has engaged in the air conditioning, sheet metal, oil burner and plumbing business, under management of E. H. Tait.

◆

James A. Ford, Inc., has been chartered in Detroit, Mich., and is engaging in the manufacture of heating and air conditioning systems at 136 North Woodward avenue. The capital stock of the company is $10,000, of which $5,000 has been paid in.

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Obituary

The death is reported of John E. Shupe, who was engaged in the sheet metal business in Portland, Ore.

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James T. Hornibrook, 63, died October 22. For forty years he owned and operated the J. T. Hornibrook Roofing Company, located at 209 East Markham St., Little Rock, Arkansas.

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William Roth, vice president and treasurer of the Mannen & Roth Co., sheet metal and air conditioning contractors of Cleveland, O., died of a heart ailment recently. He was 48.

◆

Leander L. Droesch, partner in the American Sheet Metal Co., Cleveland, O., died recently at the home of his sister in Willoughby, O. He was 36.

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Charles T. Tarpenning, 71, president of the Tarpenning-LaFollette Sheet Metal Co., Indianapolis, Ind., died recently in Asheville, N. C., where he had been under treatment for six weeks, He had been president of the company since its founding in 1920 and prior to that had been associated with the Joseph Gardner Sheet Metal Works in Indianapolis. He was a member of the Indianapolis Purchasing Agents Association and the Indianapilis Chamber of Commerce.

◆

Edward J. Sutphin, founder of a sheet metal business at 668 Manhattan Ave., Brooklyn, N. Y., when he was only 21, died recently at the age of 83. He was carrying on the business with his sons at the time of his death. Surviving are his widow, one daughter, and four sons, Edwin, Clarence, Earl and Howard, and eight grandchildren.

News Items . . . . . .

Roofing Ternes

The current revision of Simplified Practice Recommendation R30, Roofing Ternes, has been accorded the required degree of acceptance by the industry, and became effective November 1, 1937, according to an announcement by the Division of Simplified Practice, National Bureau of Standards. The revised recommendation will be identified as Simplified Practice Recommendation R30-37.

◆

Social Security Returns

Commissioner of Internal Revenue Guy T. Helvering announced on September 28 that employers subject to tax under Title VII of the Social Security Act will be required to file only one information return for the period July 1 to December 31, 1937. This is the return on Forms SS-2 and SS-2a on which the employer reports to the collector of internal revenue the amount of wages paid to each employee. These returns are used both for verifying the accuracy of the monthly Federal social security tax returns and as a basis for crediting wages to the accounts of employees in the Federal old-age benefits program.

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School of Engineering

The Milwaukee School of Engineering, Institute of Electrotechnics, located at 1020 North Broadway, Milwaukee, opened on September 7th with new courses offered. Courses in Welding Fabrication and Advanced Metallurgy, are being taught in conjunction with other courses in Welding, Electrical Engineering, Air Conditioning and Refrigeration—both day and evening.

Preceding the opening of the school year, an invitation was issued for eight illustrated lectures with some practical demonstrations; including:

Electric Arc Welding in Modern Industry, by A. M. Candy, Consulting Engineer, Hollup Corporation
Applied Metallurgy in Welding Technic, by J. C. Joublanc, Chief Metallurgist, Harnischfeger Corporation
Opportunities in Arc Welding, by K. L. Hanson, Consulting Engineer, Harnischfeger Corporation
Refrigeration and Air Conditioning in Homes and Industry, by M. J. Maiers, Electrical Engineer and Lecturer, Commonwealth Edison Co., Chicago
Railway Refrigeration and Air Conditioning, by C. G. Collow, Waukesha Motor Company

◆

Air Conditioning Regulations

Officers of the New Haven (Conn.) building department and fire department are studying the possibility of bringing an ordinance to regulate air conditioning installations before the council.

Purpose of the ordinance will be to require permits for air conditioning, to regulate the kind of ducts, vertical openings, number and location of cut-off switches and other details. The ordinance would be incorporated in the building code.

Henry G. Falsey, chief clerk of the building department, reported that extensive correspondence with other cities has failed to reveal any general air conditioning regulations.

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Glossary of Housing Terms

The Central Housing Committee, Washington, D. C., has just published a "Glossary of Housing Terms" in which they define air conditioning as "The Control of temperature, moisture content, purity and circulation of air in buildings."

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Plant Additions

W. H. Fawcett, 1334 Gladys avenue, Long Beach, Cal., has added a sheet metal department to his shop.

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The Moody Hardware Co., Harrisburg, Ore., has added a tin shop to its business, with R. G. White in charge.

With the Manufacturers . .

Harold Massey

Wm. T. Rasch, president of American Gas Products Corporation, announces the appointment of Harold Massey, to the position of general manager of sales, a position left vacant by the sudden death of H. H. Dugdale, vice-president.

A. I. Wallace

W. T. Rasch, president of American Gas Products Corporation, announces the appointment of A. I. Wallace of Chicago to the position of vice-president. Mr. Wallace has been associated with American Gas Products Corporation for the past ten years.

He will continue to make his headquarters in the Chicago office.

William R. Sweatt

Minneapolis-Honeywell Regulator Company, Minneapolis, announces with deep regret the death of William R. Sweatt on October 12.

Mr. Sweatt was president of the company from 1893 to 1927, when he became chairman of the board of directors. He retired in 1933.

Besides his wife and two daughters, Mr. Sweatt is survived by two sons—Harold W., president, who has been active head of the company since his father's retirement; and Charles B. Sweatt, vice president in charge of sales.

Fortieth Anniversary

A testimonial ceremony and presentation in honor of the fortieth anniversary of G. R. Munschauer's association with the Niagara Machine and Tool Works, Buffalo, manufacturers of Niagara presses, shears and machines for sheet metal work occurred on September 14.

During these forty years Mr. Munschauer has actively served in all divisions of the business. He became President and General Manager of the company in 1918. The Niagara Machine & Tool Works was founded in 1879.

Rex E. Hall

Rex E. Hall, general manager of The Armstrong Company, Detroit, died recently. He was 48 years of age.

Sheet Iron & Steel Prices

The American Rolling Mill Company, Middletown, O., announces that present prices of sheet iron and steel will be continued in the first quarter of next year.

A. T. Cox

The Lincoln Electric Company, manufacturers of arc welding equipment, Cleveland, Ohio, announces the appointment of Arthur T. Cox, Jr., as manager of its Tri-Cities welding sales-engineering office, located at Moline, Illinois, effective November 1.

E. H. Jones

Edmund H. Jones, 74, for almost twenty years manager of the Fireproof Division of the Milcor Steel Company, Milwaukee, died on August 29. Between January 21, 1917, and his retirement in the fall of 1936, he was responsible for many outstanding inventions in steel plaster bases and accessories for building construction.

F. S. Spear

F. S. Spear has become connected with the Young Radiator Company of Racine, Wisconsin, in an executive position and will supervise the production of Young products being supplied to the automotive, tractor, air conditioning and heating industries.

With the Manufacturers . . .

Emerson's New Cincinnati Office

The Cincinnati office of The Emerson Electric Mfg. Company is now located at 457 East Sixth street. Warehouse facilities have also been provided. Jack Searls is in charge.

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M. Parcaro

R. H. Luscombe, sales manager, Penn Electric Switch Co., Goshen, Indiana, announced the appointment of M. Parcaro as manager of Penn's New York office, effective August 15th.

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Friez Show Rooms in Boston

Julien P. Friez & Sons, Inc., of Baltimore, announce the opening of new show rooms located at 110 Arlington Street, Boston, Massachusetts, under the supervision of Harry W. Fiedler.

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R. A. Osborn

W. C. Lerch, executive vice president of the Crise Electric Mfg. Co., Mt. Vernon, Ohio, announces that R. A. Osborn has become associated with Crise with headquarters at 917 East 149th Street, Cleveland.

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New Blast Furnace

The first blast furnace to be built in the country since 1928 was placed in operation at Hamilton, Ohio, on August 26 by the Hamilton Coke and Iron Company, a wholly owned subsidiary of The American Rolling Mill Company.

The metal consigned to Middletown is transported by rail in a molten state in specially designed "thermos" cars that look like land submarines.

Charles R. Hook, president of The American Rolling Mill Company, said that the new stack was added "so the rapidly growing demands from the parent company and the outside merchant pig iron market could be satisfied."

◆

Mercoid Sales Best in History

Lewis B. Reed, president of The Mercoid Corporation, 4201 Belmont Avenue, Chicago, advises that sales for the first six months of 1937 ran more than 50 per cent above the same period in 1936. Mercoid sales for the same period in 1936 were about 50 per cent better than 1935.

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Payne Purchases Electrogas

R. V. Hiatt of the Payne Furnace & Supply Company, Bevery Hills, California, announces the recent purchase of the Electrogas Furnace & Manufacturing Company of San Francisco, to be operated as the Electrogas Division of the Payne Furnace & Supply Company, Inc. Don D. Fleming is assuming the position of general manager. W. W. Norton will continue with the firm as superintendent.

◆

Berger Warehouse in St. Louis

The Berger Manufacturing Company, subsidiary of Republic Steel Corporation, Canton, Ohio, has opened a three-floor warehouse with 40,000 square feet of floor space at 1425 North Second street, St. Louis.

Horace A. Williams, is manager of the new warehouse.

◆

Minneapolis-Honeywell Branches Expand

The Boston branch office of the Minneapolis-Honeywell Regulator Company doubles its floor space by moving into the Kenmore Square district at 797 Beacon Street.

An open house was held recently in Pittsburgh to acquaint the industry with Minneapolis-Honeywell's improved facilities at 26th and Sarah Streets.

The new Indianapolis district office at 1134 North Pennsylvania Street has been increased to include separate quarters for general, engineering, service and sales offices as well as for display rooms.

With The Manufacturers . .

Peerless on Pacific Coast

The Peerless Electric Company of Warren, Ohio, announces that they now have two warehouses on the Pacific coast for Peerless ventilators, exhaust fans and package furnace blower units; one at Portland, Oregon, and the other at San Francisco. Peerless is represented in both of these cities by the Montgomery Brothers, with headquarters in San Francisco.

◆

New Office and Warehouse Stocks

J. G. Werner has recently been appointed Philadelphia manager for L. J. Mueller Furnace Company, Milwaukee, with offices and complete warehouse stocks of air conditioning equipment, pipes, fittings, registers, and coal, oil and gas furnaces at Delaware and Morris Streets, Philadelphia. A similar set-up has been established at 405 W. Warrington Avenue, Pittsburgh, with Karl E. Kahley in charge.

The Mueller Furnace Co.'s Eastern Headquarters office has recently been moved to larger and more convenient quarters in the Candler Bldg., 123 Market Place, Baltimore. Mr. C. L. Hewitt, Jr., is Eastern sales manager.

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50th Wedding Anniversary

Mr. and Mrs. George M. Verity observed their 50th Wedding Anniversary October 19.

Honoring the golden wedding date of the founder and present chairman of the board of directors of The American Rolling Mill Company and Mrs. Verity, ARMCO employees presented them with gifts and numerous floral tributes.

More than 400 men and women from the ARMCO General Office each placed a flower in a miniature "Golden Wedding Garden" at Mr. Verity's office.

Delegations from each of the company's major plants also presented gifts and bouquets to Mr. and Mrs. Verity, who, with their son, Calvin, greeted each person and thanked them for their beautiful congratulatory messages and gifts.

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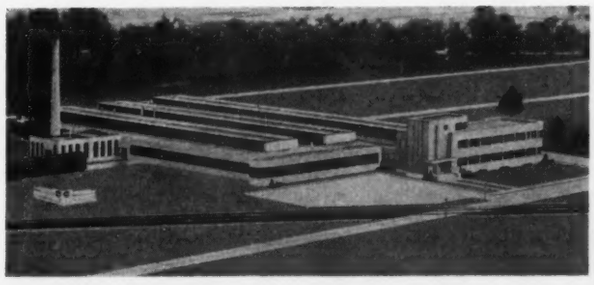

Penn Electric Completes Move

Penn Electric Switch Co. announces that entire production facilities for manufacturing oil burner, stoker, gas heating, refrigeration and air conditioning controls are now located in the company's new factory at Goshen, Indiana.

Penn Electric announced early in July the move of all executive offices, all research and development activities and a portion of its manufacturing to the new location.

The office building, equipped for year around air conditioning, symbolizes the latest in modern industrial architecture. Glass brick is used for stair lighting; architectural glass and processed wood paneling for decoration in vestibule and lobby; acoustical plaster in ceilings, and asphalt tile for floors. A massive square entrance tower with 35 ft. vertical shaft of glass brick provides striking contrast to a general exterior treatment which consists of horizontal bands of sash framed in brick work.

The factory working area is laid out for straight-line production and handling of materials.

Materials are received and products shipped over a single two-car loading dock which connects by private siding with the main line of the New York Central Railroad.

New Literature . . . .

For your convenience in obtaining copies of new Literature, use the coupon on page 112.

282—Shaded Pole Motors

General Electric Company, Schenectady, New York, is distributing a 4-page folder covering their Type KSP 3.5, 5 and 12-watt shaded-pole motors.

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283—Arc Welding Foundation News

The James F. Lincoln Arc Welding Foundation, Cleveland, Ohio, is distributing Number 1 of Volume 1 of "Arc Welding Foundation News."

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284—Nickelsworth—Vol. IV, No. 3

The International Nickel Company, Inc., 67 Wall Street, New York City, is distributing Nickelsworth for the third quarter of 1937. Various new ideas and equipment are covered.

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285—Small Lot Stampings

Dayton Rogers Manufacturing Co., Minneapolis, Minnesota, is distributing a four-page folder entitled "Metal Stampings in Small Lots." A few examples of Dayton Rogers service are listed with illustrations.

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286—Armco H. T. 50

The American Rolling Mill Co., Middletown, Ohio, has just published "Armco H. T. 50," folder in which the properties of the company's high tensile steel are described. A chart shows the comparison of physical properties between Armco H. T. 50 and mild steel.

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287—The Excelsior Code

The Excelsior Steel Furnace Co., 118 S. Clinton Street, Chicago, has just published a new edition of "The Excelsior Code," entitled "The Short Road to Success in Warm Air Heating." The company claims the results checked in connection with the Standard Code are practically the same. This code in practically the present form, they say, was used by Excelsior nearly sixty years ago.

◆

288—1937 Fan and Blowers

The Torrington Mfg. Co., Torrington, Conn., is distributing the following 1937 literature:

Autocrat propeller fans for automobile heaters, defrosters, electric home heaters, air conditioning devices, etc.

Airistocrat silent fans (DeLuxe model)

Airistocrat silent fans (Standard model)

Autocrat paddle type blower wheels, suitable for defrosters. Copies are available.

◆

289—Home Comfort Guide

Penn Electric Switch Co., Goshen, Indiana, is distributing "Home Comfort Guide" a free help in selling. This guide shows the variations in temperature between the eye-level, the four-foot zone and the ankle zone. The Penn Temtrol is located at table level, thus controlling the temperature in the four-foot comfort zone.

Penn is also distributing an envelope stuffer describing the stoker control display.

◆

290—Climate Control

L. J. Mueller Furnace Co., Milwaukee, Wisconsin, is distributing two new Mueller folders. Climate Control with Climatrol describes and pictures the latest Mueller gas furnace available in one package with automatic controls for both heat and humidity, including the new type modulating gas control which secures continuous heat flow, regulated to weather changes, turning the gas flame up or down as required to maintain the desired temperature. A new type front cover succeeds in getting over graphically to the non-technical reader the four principles of air conditioning.

Mueller Gas-Era boilers are described in a new 8-page folder which demonstrates their adaptability to many classes of heating jobs.

New Literature . . . .

For your convenience in obtaining copies of new Literature, use the coupon on page 112.

291—Illustrated Price Sheets

Perfex Corporation, Milwaukee, Wisconsin, is distributing illustrated price sheets for their stoker controls and oil burner controls, effective Aug. 1, 1937.

Loose leaves inserted in each call attention to the Series 490 out-fire control for coal burners and the series 650 new immersion hot water control with bimetal thermal element, used primarily as a safety limit control but with a wide application on summer-winter domestic hot water hook-ups for either steam or hot water systems.

◆

292—New Line of Heaters

Perfection Stove Co., Cleveland, Ohio, has just issued an attractive 16-page booklet, 6⅛ by 8½ in., in four colors, describing Superfex oil burning heaters.

The new line of heaters includes seven models, of which three are of the heat-director type, with series of shutters on three sides which can be adjusted to provide either circulating or radiating heat and also to direct it to the floor.

The heaters are described as operating satisfactorily with either No. 1 or No. 2 light domestic fuel oil.

Included in the Superfex line is a "heat projector," with forced air circulation, using a motor driven blower to distribute heated air, rated at 102,300 B. T. U., particularly suited to the heating of stores, school rooms, assembly halls and large homes.

◆

293—Electric Standard of Living

General Electric Company, Schenectady, New York, is contributing $60,000 in awards during the next year and a half as part of an ambitious attempt to bridge the wide gap between the isolated "model" home and the house in which most Americans live. Electric service companies throughout the country will launch this campaign. The G-E prizes will consist of cash awards to home builders and modernizers, scrip in $200 units that can be used for the purchase of home appliances, and finally two completely electrified homes, built to winners' specifications.

The fundamental aim of this activity is to persuade people to build better homes and to live better in the homes already built. Heating and air conditioning is one of the elements mentioned in the program which transforms shelter into better living. Details are available.

◆

294—Engineering Guide

Premier Furnace Company, Dowagiac, Michigan, is distributing the Premier Engineering Guide for forced air heating systems. This new engineering work was prepared by Roy Deming of the Premier engineering department and is written so that the average heating and air conditioning dealer can follow easily.

The Premier Engineering Guide is intended to help the dealer

1. Calculate heat losses for individual rooms and complete buildings
2. Determine furnace and blower sizes
3. Calculate air delivery requirements for individual rooms
4. Select register location
5. Design correct trunk line system
6. Design individual round pipe system
7. Estimate static pressures
8. Select proper controls

The book is intended to make forced air system design easy and interesting to the practical heating engineer. There are 40 pages (8½ x 11) bound loose-leaf between sturdy covers. Included are tables showing heat transmission coefficients, friction chart, direct reading charts for c.f.m., tables of climatic conditions, specimen plans, etc. Additional data sheets will be supplied each purchaser as they are issued by the company's engineering department.

New Literature . . . .

For Literature, use the coupon on this page.

295—Price Changes

A. G. Brauer Supply Company, 312 North Third Street, St. Louis, Mo., has published "Price Changes," applying to Catalog No. 36 and effective October 6, 1937.

◆

296—Corner Lock Forming Machine

Ward Machinery Company, 564 W. Washington Blvd., Chicago, is distributing a four-page folder illustrating and describing the Almar Corner Lock Forming Machine for which they are distributors. Facts on efficiency and economy, and specifications are included.

◆

297—A Man's Castle

Anthracite Industries, Inc., Chrysler Building, New York City, is distributing a 32-page booklet entitled "A Man's Castle," setting forth the advantages of anthracite. The organization offers full information to the home owner regarding any phase of modern heating.

This organization is also distributing two envelope stuffers—one on thermostatic control and the other on anthracite water heaters—both for the ultimate consumer. Supplies are available.

◆

298—The "Mystery" of Air Conditioning

Dail Steel Products Co., Lansing, Michigan, is distributing a 16-page booklet entitled "Taking the 'Mystery' Out of Air Conditioning." Human comfort is defined, and reasons for discomfort are given. The objective of the air-conditioning engineer is to provide a proper balance between temperature and humidity to secure human comfort, to clean and distribute the air with a gentle even flow that will prevent stagnation or drafts. The booklet was published primarily to afford valuable and interesting information to those considering air conditioning in plain, simple, understandable language.

◆

299—New Moncrief Literature

The Henry Furnace & Foundry Co., Cleveland, Ohio, is distributing a new folder entitled "The Whole Family Benefits when you bring your home up-to-date with Moncrief winter air conditioning."

The Moncrief special oil-fire winter air conditioners for small homes are covered in a four-page booklet with space for dealer imprint.

The Moncrief Aristocrat oil fire winter air conditioners, said to be 83 percent efficient, are pictured and described in an eight-page booklet to be distributed by the dealer. Special features are listed, and specifications are given.

FOR YOUR CONVENIENCE

American Artisan, 6 N. Michigan Ave., Chicago, Ill.

Please ask the manufacturer to send me more information about the equipment mentioned under the following reference numbers in "New Products" and "New Literature." (Circle numbers in which you are interested):

171	172	173	174	175	176	177
178	179	180	181	182	183	184
185	186	187	188	189	190	191
			282	283	284	285
286	287	288	289	290	291	292
293	294	295	296	297	298	299

Name..... Title.....

Company .....

Address .....

Are you Manufacturer——Jobber——Dealer——

Statement of the Ownership, Management, Circulation, etc., Required by the Acts of Congress of August 24, 1912, and March 3, 1933

Of American Artisan, published monthly at Chicago, Illinois for October 1, 1937.

State of Illinois, County of Cook, ss.: Before me, a Notary Public in and for the State and county aforesaid, personally appeared F. P. Keeney, who, having been duly sworn according to law, deposes and says that he is the business manager of the American Artisan, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, Keeney Publishing Company, Chicago, Illinois.
Editor, J. D. Wilder, Chicago, Illinois.
Managing Editor, J. D. Wilder, Chicago, Illinois.
Business Manager, F. P. Keeney, Chicago, Illinois.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.)

Keeney Publishing Company, 6 N. Michigan Ave., Chicago, Illinois. Stockholders: F. P. Keeney, Chicago, Illinois; W. J. Osborn, Fairfield, Conn.; R. Payne Wettstein, Chicago, Illinois; Chas. E. Price, Chicago, Illinois; Robert A. Jack, Cleveland Heights, Ohio.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the twelve months preceding the date shown above is .....
(This information is required from daily publications only.)

F. P. Keeney,
Business Manager.

Sworn to and subscribed before me this 22nd day of September, 1937.
(SEAL) Grace E. Waymire, Notary Public.
(My commission expires February 10, 1938.)

Dust Flue

(*Continued from page* 31)

m and locating *m″*. Now draw a perpendicular line from *e* on the side elevation allowing it to intersect the horizontal lines drawn from *v* and *s*, locating *v′* and *s′*, and from these points draw the straight lines to *m″*. Through *m″* on pattern *B* erect a perpendicular line and upon this line step off distances *5* to *6*, and *6* to *7*, found upon *m-v* of the front elevation, also distances *m* to *4* and *4* to *3*.

From each of these points draw horizontal lines intersecting the vertical lines previously drawn from like numbers found on the side elevation. Draw the curved line through these points thus completing the pattern for *B*. Here again the distance from *m″* to *3* or *7* can also be taken from *m* to *a* on the front elevation, which is the true length of the distance to the point of intersection of the flue and the valley line. This same method may be used when the flue is not exactly in the center of the intersection of the roof ridges.

To develop the pattern for the flue use the parallel line method of development. Extend the top horizontal line of the flue, making the stretchout line *a-b* of the pattern. Upon this line step off the sixteen spaces of the circle representing the profile view of the flue found on the plan. Drop lines from each of these points as shown and from the side elevation draw horizontal lines from each of the numbers intersecting like numbers on the pattern. Draw the curved line, describing the pattern, through these points, thus completing the pattern for the flue.

Air Conditioning Courses

Evening instruction in heating, ventilating and air conditioning is being offered by the Polytechnic Institute of Brooklyn, New York, during the regular 1937-38 school sessions, according to an announcement of Prof. E. F. Church, Jr., head of the department of mechanical engineering. Classes will be held on Wednesday and Friday evenings, with registration for the first session in Heating and Ventilating during the week of September 13, 1937. This course covers the basic elements of air conditioning with relation to the engineering design and selection of equipment for modern domestic and commercial heating and ventilating systems. Problems will be given illustrating the application of various systems to residences, apartments, office buildings, schools, factories and theaters.

Beginning in February, 1938, the course in air conditioning will deal with advanced considerations in the field of the previous course, and will present fundamental psychrometric principles and their application to cooling, humidifying and dehumidifying of air for central station or unit type systems. In connection with design of equipment for comfort and commercial air conditioning systems, the sessions will cover the theory of refrigeration, cooling load computations, air distribution and duct design, sound control; and methods of surface cooling, by-pass recirculation, and chemical dehumidification of air.

Both courses of instruction will be presented by John James of New York City, a graduate of Oregon State College, and University of Wisconsin, and now a member of the Technical Staff of the American Society of Heating and Ventilating Engineers. In addition to Mr. James' experience in connection with engineering research in air conditioning he has also been conected with the consulting engineering field, designing mechanical equipment for various types of public and private buildings.

LONG LIFE

This remarkable alloy prepared under an exclusive Lyon, Conklin & Co., Inc. formula outlasts by years ordinary sheet metals. To get the most for your sheet metal dollar--insist upon Lyonore Metal for all sheet metal work. Complete details upon request.

LYON, CONKLIN & CO., Inc.
Baltimore, Maryland

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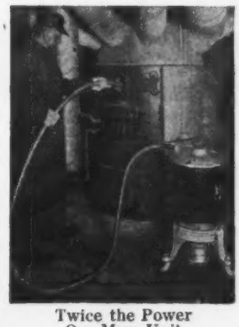

Twice the Power One-Man Unit

WANT MORE PROFITS? ? ?
They Can Be Yours
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DOUBLE SUCTION

BECAUSE:

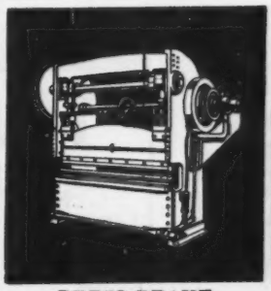
The Kent cleans faster—more thoroughly—its sturdy build insures long life and low upkeep.

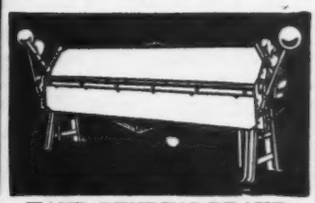
It will pay you to investigate. Write today.

THE KENT COMPANY, Inc.
167 CANAL STREET ROME, N. Y.

KEEP OLD MAN WINTER ON THE RUN

XX TH CENTURY HEATING & VENTILATING CO.
AKRON, OHIO





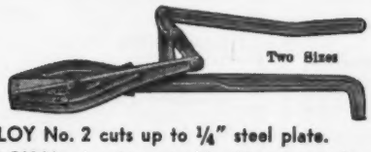
CHICAGO

PRESS BRAKE HAND BENDING BRAKE

Steel Brakes—Presses—Shears

DREIS & KRUMP MFG. CO.
7404 LOOMIS BLVD. CHICAGO

PORTABLE SHEARS
ALL-ALLOY



ALL-ALLOY No. 2 cuts up to ¼" steel plate.
ALL-ALLOY No. 1 cuts up to No. 11 gauge strip or sheet.
Special blades may be had for shearing stainless steel.

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BREMIL MFG. CO. Erie, Pa.

Furnace Repair Parts

Write for Catalogue.

BANNER REPAIR PARTS CO.
YOUNGSTOWN, OHIO

Air Conditioning

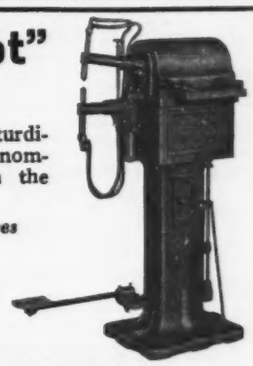
—What happens between two rooms, one having a six minute air change, and the adjoining room a twelve minute air change?
—Can you install a thermostat control system properly?

The answers to these and hundreds of other mechanical questions about air conditioning are appearing in the monthly *Air Conditioning Section* of AMERICAN ARTISAN.

If you do not now get the ARTISAN, send us $2 and we will enter your subscription for a full year—12 consecutive issues. Your subscription will yield a rich harvest of money making ideas and solutions to many mechanical problems connected with warm air heating and sheet metal contracting.

AMERICAN ARTISAN
6 North Michigan Ave. Chicago, Ill.

ACME "Hot Spot" WELDERS



Universally accepted as the sturdiest, easiest handled, most economical electric Spot Welder on the market.

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SPOTWELD!
with an ACME
Lifetime Guarantee!

Complete range of sizes

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Warehouses in principal cities
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Classified

SITUATION OPEN

WANTED: EXPERT BLOW PIPE MECHANIC, neat, efficient as partner or hour work. Address Key No. 419, American Artisan, 6 N. Michigan Ave., Chicago, Ill.

Manufacturers Agents

MANUFACTURERS WANTING ADditional representation often come to us for names of prospective agents now handling other lines in this field on a commission basis in a definite territory. It will pay you to be on record with us so we can refer your name to interested manufacturers. No charge or obligation, of course. It is a service we render free to manufacturers and representative. Just drop a line that you are interested in being on file and we will send you form to fill out. Address American Artisan, 6 N. Michigan Ave., Chicago, Ill.

JOHNSON'S
NEW HANDY MANUAL
on
HEATING, VENTILATING
MECHANICAL REFRIGERATION
and
AIR CONDITIONING

432 pages of practical, condensed information, tables, rules and diagrams. Price $1.00 — Remit with order to

KEENEY PUBLISHING COMPANY
6 N. Michigan Ave., Chicago, Ill.

The new American Artisan Service Section presents a golden opportunity to contact a national circulation at comparatively small cost. Manufacturers can use it to make any article sell and dealers will find it an inexpensive way to contact a live buying trade. Don't delay—send in your copy now for the next issue. See bottom of page for rates.

Use AMERICAN ARTISAN Classified Advertising for quick results. It puts you in direct touch with the buyers and sellers in the warm air heating, sheet metal contracting and air conditioning industry.

AMERICAN ARTISAN Service Section

Sheet Metal Machines
New and *Really Rebuilt*

A machine for every use and every machine is ready for use. The largest stock in Chicago. Ask for list.

Complete supplies and tools.

MAPLEWOOD
MACHINERY CO., Inc.
Chicago

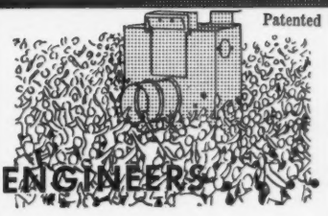
2634 W. Fullerton Ave. Brunswick 9200
561 W. Washington Blvd. State 1405

VENTILATING EQUIPMENT
Everything in Exhaust Ventilation
HEAT—SMOKE—FUMES
Gravity and Fan Ventilators
Write for Information and Advice
PAUL R. JORDAN & CO.
631 S. Delaware St., Indianapolis, Ind.

BUY ALL OR PART
COMPLETE SHEET METAL SHOP

Hollow Mandrel Stake	$ 5.50
Beakhorn Stake	10.00
Blowhorn Stake	6.00
Rolls, Slip, 3'3"; 4'3½"; 4'6".	
Chgo. Steel Slitter	8.50
Press Brakes, 5' 18 ga.; 10' 18 ga.	
No. 10 Whitney Hand Punch	10.00
18 Ga. Marsh. Throatless Shear	22.50
Beverly Throatless Shear 14 ga.	15.00
Comb. No. 0585 Pexto Crimper & Beader	
B. G. 20 ga.	15.00
10' 16 ga. Chgo. Steel Brake	250.00
10' Elec. City Gutter Forming & Beading Machine with forms	100.00
¼" Black & Decker Elec. Drill	15.50
30" 18 ga. Pexto Foot Shear, all ga.	65.00
Wagner Brake Slitter	15.00
8' 18 ga. Chgo. Steel Brake	125.00
30" Pexto Bar Folder	35.00
36" x 2" Slip Roll	25.00

INTERSTATE MACHINERY CO., INC.
107 S. Clinton St., Chicago
(Free Parking)

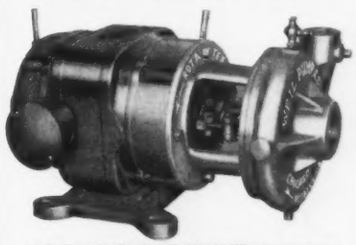


ENGINEERS

everywhere are proclaiming the efficiency of the New *Howle Heat Extractor*. It extracts heat; it radiates heat; it stores excessive condensate and prevents escape of costly preheated air; it raises basement temperatures 10° to 20° F. So efficient is the *Howle Heat Extractor* that you cannot touch its front surface but you can lay your cheek against its rear.

CONDENSATION ENGINEERING CORPORATION
335 S. Western Ave., Chicago, Illinois

AIR WASHER PUMP



Ask For Bulletin R-5500 Electropump
WEIL PUMP COMPANY
Wells and Superior Sts. CHICAGO, ILL.

Robert Barclay INC. **OIL BURNER SUPPLIES**

DEALERS SAVE MONEY by writing for Barclay's bargain catalog of all installation accessories and replacement parts for oil burners, stokers, forced air and automatic heating. 4 hour shipment. **ROBERT BARCLAY, INC.**, 128 N. Peoria Street, Chicago, Illinois.

RIBBED WIRE GLASS - 13c per SQ. FT.
STOCK SHEETS, CASE LOTS, PLUS BOXING F. O. B. BUFFALO, N. Y. SHIPMENT TO ANY PART OF THE UNITED STATES
QUOTATIONS ON ALL KINDS OF GLASS ON REQUEST
Write for Samples
T. J. ATCHESON GLASS CO.
953 Main St., Dept. A, Buffalo, N. Y.

IT'S CHIMNEY TOP TIME

Accurate Revolving Ventilators MAKE GOOD CHIMNEY TOPS. POSITIVELY PREVENTS DOWN DRAFT. Will please your most exacting customer. Low Priced.

SEE YOUR JOBBER TODAY OR WRITE US DIRECT

ACCURATE MFG. WORKS
2432 MILWAUKEE AVENUE
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ARREST YOUR ATTENTION

To qualify for more and bigger Sheet Metal and Heating jobs in 1938.

We have a special Training Service for Employers, their sons, Mechanics, Apprentices, etc. Each Student is trained in as personal a way as possible in Laying Out, Plan Reading, Figuring, Designing jobs, Estimating and Supervision of the work. This is Your Key to open the door of Opportunity. Our Courses are specially prepared for Home Study Instruction.

Information is free, no obligation, write today for subjects interested in.

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- ☐ Forced Air Heating & Air Conditioning.
- ☐ Mechanical Air Conditioning, Refrigeration.
- ☐ Heating-Ventilating Engineering.
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ST. LOUIS TECHNICAL INSTITUTE
O. W. Kothe, Director
4541 Clayton Ave. St. Louis, Mo.

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Index to Advertisers

Firms represented in this issue are identified by the folio of the page on which their advertising appears.

November, 1937

You Name the JOB . . . / We'll Supply the *Right* FAN!

★ Whatever your air moving problem—large or small, intricate or simple—you will save much time and trouble, and be sure of the Right Fan for every job when you secure the fan from Buffalo Forge. Furthermore, you immediately obtain the benefit of the world-wide experience of our large fan engineering staff. ★ We especially call your attention to the fans illustrated below, all of which have won high recognition and wide usage among those whom you serve.

BUFFALO FORGE COMPANY

497 BROADWAY — *Branch Engineering Offices in Principal Cities* — BUFFALO, N. Y.

In Canada: Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

ENTILATION FOR LARGE BUILDINGS

"Buffalo"

Limit-Load
noidal Fans

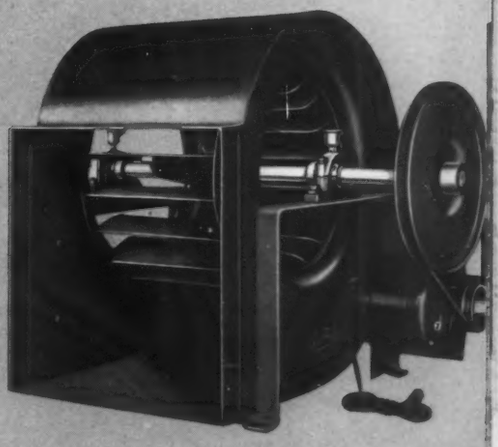
ilable with Silent
ating Base, these
s easily solve the
tilating problems
arge buildings. De-
ed for high effici-
y—quiet opera-
n. Non-overload-
, regardless of air
ivery or pressure.

FORCED WARM AIR HEATING

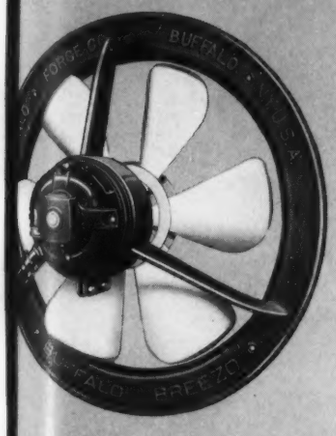
"Buffalo"

HVA
FANS

Available complete with one piece motor mounting and motor for quick easy installation. Quiet in operation. The fan you can always "depend on."



OR SHOP VENTILATION



"Buffalo"

BREEZO

First choice of thousands of shops where good ventilation is desired at minimum cost. "Buffalo" Breezo Fans force bad air out, draw fresh air in. Quiet in operation, as are *all* "Buffalo" Fans.

FOR HOME COMFORT COOLING

"Buffalo"

BREEZ-AIR
ATTIC FANS

This large volume, quiet, easy t
install "Buffalo" Fan is bringin
new summer comfort to thousan
of home owners, and plenty of e
tra profit to the dealers and distr
butors who are going out after th
business.

Write today for full details

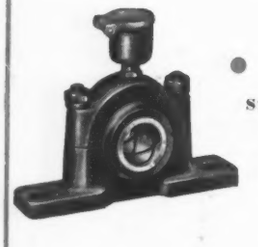
QUIET

YOUR 1938 UNITS *with* RANDALL PILLOW BLOCKS

Your contractor will tell you this is the most important thing you can do for your new line

● The many manufacturers who standardized on Randall bearings for their air conditioning units have benefited through more sales and greater user satisfaction.

Ask the man responsible for the satisfactory operation of your equipment and he will tell you how important it is to assure freedom from metallic bearing noise and long, trouble-free service with Randall bearings. There is a Randall Pillow Block for every requirement and in every size.



Standard Pillow Block

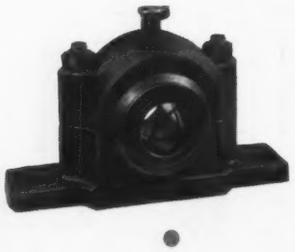
Cut-away section of ball of Standard Pillow Block

Specify Randall Pillow Blocks

Use Randall Pillow Blocks and you can be sure that your customers will have continuous satisfactory bearing operation and that your contractors will benefit by increased confidence and good will. Write for descriptive catalogs, without obligation. Randall Graphite Products Corp., Dept. 1111, 609 W. Lake St., Chicago, Ill.

Randall

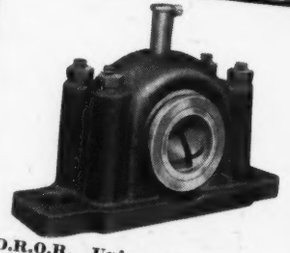
D.R.O.R. Flange Pillow Block



D.R.O.R. Pillow Block

Cut-away section of ball of Flange and D.R.O.R. Pillow Blocks showing Double Reservoir Oil Return Feature.

Exhibiting
In Booth No. 342
International Heating & Ventilating Exposition,
Grand Central Palace,
New York,
January
24 to 28.



D.R.O.R. Universal Pillow Block—Can be mounted in any position. Unscrew the oiler, turn the ball to the desired mounting position and reinsert oilcup in a vertical position